
IGGA: A Dataset of Industrial Guidelines and Policy Statements for Generative AIs

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IGGA (Industrial Guidelines/policy statements for Generative AIs) is a comprehensive dataset comprising 160 guidelines and policy statements pertaining to the use of generative AIs and large language models across 14 industry sectors. These guidelines were systematically selected and gathered from official company websites and reliable sources spanning six continents. The dataset, containing 295,692 words, is designed to support various natural language processing tasks, including language modeling, sentiment analysis, semantic analysis, model synthesis, classification, and topic labeling. Additionally, it serves as a benchmark for tasks such as ambiguity detection and requirements categorization. This resource aims to advance research in AI governance within industrial settings, fostering a deeper understanding of how AI technologies are integrated into industry practices.

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This dataset is organized into several sections to facilitate its use: **Section I** contains a table listing the 160 Industrial guidelines and policy statements; **Section II** provides academic citations for each guideline; and **Section III** includes the complete texts of all 160 guidelines and policy statements, accompanied by a detailed table of contents.

I. 160 Industrial Guidelines and Policy Statements for Generative AIs

	Industry	Company	Name of document/website	Country	Continent	
1	Healthcare Counseling (10)	1	Becker's Healthcare	Should health systems regulate the use of ChatGPT?[1]	USA	North America
		2	Orbita Hospitals and Health Care	OpenAI and ChatGPT: A Primer for Healthcare Leaders[2]	USA	
		3	Chugai Pharmaceutical Co	Chugai DX Meeting[3]	Japan	Asia
		4	Daiichi Sankyo Company	Daiichi Sankyo's Challenge to Realize: 2030 Version[4]	Japan	
		5	Hardian Health	How to get ChatGPT regulatory approved as a medical device[5]	UK	Europe
		6	AstraZeneca	AstraZeneca data and AI ethics[6]	UK	
		7	Procaps Group	Procaps participate in panels on digitalization and artificial intelligence in pharma manufacturing[7]	Colombia	South America
		8	1DOC3	1DOC3: ACCESSIBLE HEALTHCARE TO MILLIONS[8]	Colombia	
		9	CSL Limited	Artificial Intelligence at CSL[9]	Australia	Australia
		10	DokiLink	Artificial Intelligence in Africa's Healthcare: Ethical Considerations[10]	South Africa	Africa
2	Technology and IT Services (30)	11	Microsoft	Artificial Intelligence (AI) usage policy for Microsoft[11]	USA	North America
		12	Apple	Apple Restricts Use of ChatGPT[12]	USA	
		13	Alphabet	Google AI principles[13]	USA	
		14	Meta Platforms, Inc.	Meta Guideline to Responsible AI[14]	USA	
		15	Amazon	AWS Responsible AI Policy[15]	USA	
		16	Oracle	Oracle Generative AI strategy[16]	USA	

3	Finance and Banking (10)	17	Adobe	Adobe Generative AI Guideliens[17]	USA	Asia
		18	Qualcomm	Qualcomm AI strategy[18]	USA	
		19	Salesforce	Generative AI: 5 Guidelines for Responsible Development[19]	USA	
		20	CGI Inc	CGI optimizing generative AI potential[20]	Canada	
		21	LG Electronics	LG Presents 'AI Ethics Principles' for Trustworthy AI Research[21]	South Korea	
		22	Fujitsu	Fujitsu Generative AI use guidelines[22]	Japan	
		23	Panasonic	Panasonic Responsible AI use[23]	Japan	
		24	Sony	Sony Responsible AI Usage[24]	Japan	
		25	Asm Pacific Technology	ASMPT 2023 Interim Report[25]	Hong Kong	
		26	Infosys	Infosys Responsible AI[26]	India	
		27	Samsung Group	Samsung Group Digital Responsibility[27]	South Korea	
		28	Sea Limited (Garena)	Sea Limited – Digital Transformation Strategies[28]	Singapore	
		29	Grab	Grab's AI Ethics Principles[29]	Singapore	
		30	Sea Group	Sea Founder Warns of Turmoil From the Shift to AI[30]	Singapore	
		31	Atos	Atos blueprint for generative AI[31]	France	Europe
		32	Capgemini	AI code of ethics.[32]	France	
		33	Dormakaba	AI based anti-tailgating Solution[33]	Switzerland	
		34	Ericsson	trustworthy AI[34]	Sweden	
		35	Accenture	AI ethics & governance[35]	Ireland	
		36	SAP	SAP AI ethics[36]	Germany	
		37	amadeus it	Capturing the power of Generative Artificial Intelligence to enhance the passenger experience[37]	Spain	South America
		38	Gorilla Logic	Ai in product development[38]	Costa Rica	
		39	Atlassian	Atlassian Intelligence is built on trust[39]	Australia	Australia
		40	Flutterwave	Flutterwave strategic agreement[40]	Nigeria	Africa
		41	JPMorgan Chase	JPMorgan Chase Restricts Staffers' Use Of ChatGPT[41]	USA	North America

		42	Wells Fargo	Wells Fargo, artificial intelligence, and you[42]	USA	
		43	Mizuho Financial Group	Mizuho permits 45,000 employees to use generative AI[43]	Japan	Asia
		44	State Bank of India	SBI Embraces AI and ML Technologies to Transform Banking Operations[44]	Japan	
		45	HSBC Holdings Plc	HSBC principles for ethical use of data and AI[45]	UK	Europe
		46	Lloyds Banking Group	How AI automation is helping[46]	UK	
		47	Itaú Unibanco Holding	Brazil's Itaú in 'very good position' to harness generative AI[47]	Brazil	South America
		48	Banco de la Nacion Argentina	Ethical and responsible use of AI in Argentina worker's rights[48]	Argentina	
		49	Westpac	How AI will shape the future of banking[49]	Australia	Australia
		50	Standard Bank Group	The Future of Digital Banking and Transacting in Africa[50]	South Africa	Africa
		4	Publication Industry (10)	51	Elsevier	The use of generative AI and AI-assisted technologies in writing for Elsevier[51]
52	The New York Times Company			AI workplace changes[52]	USA	
53	China Daily			Guidelines establish proper uses of AI in research[53]	China	Asia
54	South China Morning Post			China unveils new artificial intelligence guidelines [54]	China	
55	Penguin Random House			Penguin Random House CEO hopes AI will help sell more books: Report[55]	UK	Europe
56	Wolters Kluwer			Artificial Intelligence (AI) Principles[56]	Netherland	
57	Grupo Planeta			AI policy[57]	Spain	South America
58	Grupo Editorial Record			Principles for AI[58]	Brazil	
59	Allen & Unwin			AI and International security[59]	Australia	Australia
60	News24			News24 to use AI in moderating comments[60]	South Africa	Africa
5	Language Translation Services (10)	61	American Translators Association	ChatGPT for Translators: How to Use the Tool to Work More Efficiently?[61]	USA	North America
		62	TransPerfect	TransPerfect generative AI[62]	USA	

		63	SEAtongue	Using AI for interpretation[63]	Malaysia			
		64	Jinyu Translation	Translation: Measures for the Management of Generative Artificial Intelligence[64]	China	Asia		
		65	SDL plc	SDL to expand knowledge discovery and intelligent process automation to additional languages[65]	UK	Europe		
		66	Lionbridge	Lionbridge usage of AI[66]	Ireland			
		67	Altura Interactive	ChatGPT translation[67]	Mexico			
		68	GLOBO Brazil	Globo Pacts with Google Cloud in Bid to Become a Mediatech Company[68]	Brazil	South America		
		69	Straker Translations	Traker translations security[69]	New Zealand	Australia		
		70	Elite Translations Africa	Harness the power to AI for preservation of African languages[70]	Kenya	Africa		
		6	Construction and Urban Planning (10)	71	Bechtel	Applications of Artificial Intelligence In EPC[71]	USA	North America
				72	Turner Construction Company	AI at 2023 summit[72]	USA	
73	Hyundai E&C			Hyundai E&C ensures Safety and Quality Management of construction sites[73]	South Korea	Asia		
74	Shimizu Corporation			Shimizu develops AI systems for initial structural designs[74]	Japan			
75	Vinci SA			Innovation and prospective[75]	France	Europe		
76	Bouygues Construction			Innovation strategy[76]	France			
77	Grupo ACS			Shareholder's meeting & future prospects[77]	Spain	South America		
78	Sacyr			IntegratedSustainabilityReport 2022 – Committed to a Sustainable Future[78]	Argentina			
79	Lendlease			Lendlease CEO on using AI in their businesses[79]	Australia	Australia		
80	Arab Contractors			UAE National strategy for generative AI[80]	Egypt	Africa		
7	Counseling and management (10)	81	McKinsey	About half of McKinsey staff allowed to use generative AI: report[81]	USA	North America		
		82	Deloitte	Deloitte Launches Innovative 'DARTbot' Internal Chatbot[82]	USA			

		83	Tata Consultancy Services	The future is AI. The future is human[83]	India	Asia		
		84	Infosys	Responsible ai[84]	India			
		85	Roland Berger	ChatGPT a game changer for artificial intelligence[85]	Germany	Europe		
		86	Grupo Assa	Digital transformation practice[86]	Brazil	South America		
		87	Falconi Consultores de Resultado	Optimizing performance with artificial intelligence[87]	Brazil			
		88	Nous Group	AI powering innovation and productivity [88]	Australia	Australia		
		89	Africa International Advisors	Future of Africa International Advisors Group[89]	South Africa	Africa		
		8	Design and Fashion Technology (10)	90	Nike	Nike leveraging AI in operations[90]	USA	North America
				91	Ralph Lauren Corporation	Ralph Lauren testing AI[91]	USA	
92	Comme des Garçons			AI designer creating fashion grails from iconic runways[92]	Japan	Asia		
93	Shiseido Company, Limited			AI and change in management[93]	Japan			
94	LVMH Moët Hennessy Louis Vuitton SE			Joins stanford development program[94]	France	Europe		
95	Kering			AI and innovation[95]	France			
96	Havaianas			AI powered Case study[96]	Brazil	South America		
97	Fatabella			Falabella hires Amelia as a digital assistant for its employees[97]	Chile			
98	Cotton On Group			How Cotton On Is Taking the Aussie Aesthetic Global with AI[98]	Australia	Australia		
99	David Tlale			South Africa to adopt AI[99]	South Africa	Africa		
9	Entertainment and game development (10)	100	Activision Blizzard	AI in game development[100]	USA	North America		
		101	Electronic Arts	AI in game industry[101]	USA			
		102	Tencent	Tencent AI policy[102]	China	Asia		
		103	Square Enix	Letter from the president on AI[103]	Japan			
		104	Ubisoft	Ghostwriter using AI in script writing[104]	France	Europe		
		105	Supercell	Supercell AI fund venture[105]	Finland			
		106	Wildlife Studios	AI trust and safety[106]	Brazil			

		107	Globant	Globant AI Manifesto[107]	Argentina	South America
		108	Wargaming Sydney	AI in Wargaming[108]	Australia	Australia
		109	Kukua	Future production with AI[109]	Kenya	Africa
10	Journalism and News Media (10)	110	New York Times	The New York Times is building a team to explore AI in the newsroom[110]	USA	North America
		111	ABC News	ABC builds its own AI model[111]	USA	
		112	JoongAng Daily	JoongAng Group Builds South Korea's First AI-Driven Enterprise Network by Juniper[112]	South Korea	Asia
		113	Asahi Shimbun Company	Panel Discussion Artificial Intelligence and Democracy[113]	Japan	
		114	BBC	BBC AI Principles[114]	UK	
		115	Reuters	Reuter AI ethics and principles[115]	UK	
		116	Grupo Globo	Grupo Globo CEO on Evolving rules and regulations surrounding AI[116]	Brazil	South America
		117	Pharu	Pharu and his challenge of bringing analytics to Latin American culture[117]	Chile	
		118	News Corp Australia	News Corp AI powered News[118]	Australia	
		119	Nation Media Group	State in battle to protect data privacy, enhance security in the AI age[119]	Kenya	Africa
11	Pharmaceutical Research and Development (10)	120	Pfizer Inc.	Pfizer AI policy and position[120]	USA	North America
		121	Johnson & Johnson	Jnj policy and positions[121]	USA	
		122	Takeda Pharmaceutical Company Limited	Takeda position on AI[122]	Japan	Asia
		123	Eisai Co., Ltd.	AI in drug design[123]	Japan	
		124	Roche Holding AG	Harnessing the power of AI[124]	Switzerland	Europe
		125	Novartis International AG	Ethical and responsible use of AI[125]	Switzerland	
		126	EMS S/A	AI in EMS the future is here[126]	Brazil	South America
		127	Sanofi	Sanofi Responsible AI principles[127]	Brazil	

		128	CSL Limited	Artificial intelligence at CSL[128]	Australia	Australia
		129	Fidson	Integrating tech into healthcare profitable – Firm[129]	Nigeria	Africa
12	Social Media and Networking/ telecommunications (10)	130	Twitter (X)	Synthetic and manipulated media policy[130]	USA	North America
		131	LinkedIn Corporation	Linkedin engineering responsible AI[131]	USA	
		132	Alibaba Group Holding Limited	Alibaba Cloud Unveils New AI Model to Support Enterprises’ Intelligence Transformation[132]	China	Asia
		133	WeChat	Wechat AI privacy policy[133]	China	Asia
		134	Spotify Technology S.A.	Spotify using AI[134]	Sweden	Europe
		135	Skype	Skype Translator AI policy[135]	Luxemburg	
		136	MercadoLibre, Inc	Improving user experience and boost sales with AI[136]	Argentina	South America
		137	América Móvil	The ITU recognizes the Carlos Slim Foundation and América Móvil for their technological innovation in health care[137]	Mexico	
		138	Accel IT	Accel’s AI Investments Keep The Focus On Applications And Tooling[138]	Australia	
		139	MTN SA	MTN SA introduces Siya as it intensifies its AI Strategy in a bid to boost efficiency and revenue[139]	Nigeria	Africa
13	Advertising and marketing (10)	140	WPP plc	AI regulation is about finding the right balance[140]	USA	North America
		141	Omnicom Group Inc.	Omnicom first mover access to AI insights[141]	USA	
		142	Dentsu Group Inc.	Dentsu AI innovations[142]	Japan	Asia
		143	Hakuhodo DY Holdings Inc.	Interview with the CFO on artificial intelligence[143]	Japan	
		144	Publicis Groupe SA	PUBLICIS IS PUTTING AI AT ITS CORE TO BECOME THE INDUSTRY’S FIRST INTELLIGENT SYSTEM[144]	France	Europe
		145	Havas Group	AI makes its mark at Havas group[145]	France	
		146	Grupo ABC	AI resource guide[146]	Brazil	

14	Legal Tech/ Legal Services/ Intellectual Property Law (10)	147	DPZ&T	Domino's (DPZ) Boosts AI Capabilities With Microsoft Partnership[147]	Brazil	South America
		148	Clemenger Group	Bad News? Send an AI. Good News? Send a Human[148]	Australia	Australia
		149	Ogilvy Africa	Creativity, business and society in the age of AI[149]	South Africa	Africa
		150	LegalZoom	LegalZoom Launches Doc Assist in Beta, Combining the Power of GenAI and Our Independent Attorney Network[150]	USA	North America
		151	Thomson Reuters	AI principles[151]	USA	
		152	Zegal	Comprehensive impact of AI[152]	Hong Kong	Asia
		153	Cyril Amarchand Mangaldas	Legal Technology & Alternative Legal Services Guideline [153]	India	
		154	Rocket Lawyer	AI workplace use policy[154]	UK	Europe
		155	Allen & Overy	Artificial Intelligence Use Case at A&O[155]	UK	
		156	Demarest Advogados	Good practices using AI[156]	Brazil	South America
		157	Lopes Pinto, Nagasse	AI, Data Protection & Privacy 2024 legislation[157]	Argentina	South America
		158	Lawpath	Artificial Intelligence: What is it and Can it Help My Business?[158]	Australia	Australia
		159	Webber Wentzel	Webber Wentzel embraces Generative AI as part of its ongoing innovation journey[159]	South Africa	
		160	ENS Africa	Responsible AI: embracing generative artificial intelligence technologies- a brief guide for organisations[160]	South Africa	Africa

II. References

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III. Texts of 160 Guidelines and Policy Statements with a Detailed Table of Contents

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1. Should health systems regulate the use of ChatGPT?

As hospitals and health systems begin to experiment and pilot generative AI such as ChatGPT, many CIOs and IT leaders said CIOs must be the ones to develop policies around appropriate use cases and must evaluate frameworks and regulations to stay on top of industry standards on generative AI.

Becker's asked four IT leaders: Should health systems begin to regulate the use of ChatGPT?

Robert Eardley. CIO of University Hospitals (Cleveland): Generative AI capabilities such as ChatGPT that are embedded into core computer applications should follow a governance process to other net-new technologies.

Organizations should acknowledge the importance that any "drafted" responses are subject to human review and approval. Most important early on is to be aware of and inventory the use of any generative AI explorations within the organization. Automated responses based upon generative AI should be tightly reviewed and approved for use within that context. Automated generative AI capabilities should undergo a stringent review process for accuracy in ways that other technologies have been embedded into an organization's workflow over time (such as drug-drug interaction alerts to prevent medication errors).

Darrell Bodnar. CIO of North Country Healthcare (Whitefield, N.H.): I think that CIOs must take a position and develop policies around the appropriate use of ChatGPT and all AI language models and services.

North Country Healthcare has already taken a position and provided a detailed policy and framework for the use and adoption of ChatGPT "like" models.

Guidelines and regulated access need to be documented around all use, including clinical and nonclinical scenarios and the potential to share [protected health information] strictly defined. There also needs to be consideration for relying upon any such services for guidance and decision-making and the liabilities that accompany the process.

There is no doubt that AI language models like ChatGPT are going to revolutionize the way we all work. The potential benefits in healthcare at a time when labor markets are stretched so thin in every service and vertical are tremendous; we just need to proceed with the same caution we embrace any new technology.

Sunil Dadlani. Executive Vice President and Chief Information and Digital Transformation Officer of Atlantic Health System (Morristown, N.J.): The use of ChatGPT and similar technologies is rapidly expanding. But before widely adopting them across a healthcare organization, there are several steps CIOs must take to ensure they are integrated in productive and secure ways.

Safely adopting any new technology is tied directly to a solid understanding of the regulatory landscape, particularly when it comes to the governing rules around data security including HIPAA and GDPR. Additionally because healthcare technology environments are interconnected, leaders

must have full visibility into the access and usage agreements in place with third-party vendors and others to ensure data protection. When possible, try to avoid the danger of "building the car while driving it" and have proper policies and guidelines governing the use of generative artificial intelligence and machine learning technology in place.

Educating team members about the capabilities and risks associated with these technologies will help ensure they are used properly. Always be ready to conduct risk assessments and perform continuous monitoring and evaluations.

Maintaining cross-functional internal and external partnerships will also help you gain those insights more comprehensively.

Finally, make sure you are staying current with industry advancements, regulations, compliance and ethical frameworks. This field is evolving quickly, and staying a step ahead will help avoid mistakes in the future.

Paul Conocenti. CIO of Montage Health (Monterey, Calif.): At Montage Health, we are closely monitoring this new technology. We are cautiously optimistic of its value and equally concerned about its misuse and accuracy. Before moving any technology into our production environment, the use case must be validated and monitored for accuracy and security compliance — ChatGPT is no exception

[2. OpenAI and ChatGPT: A Primer for Healthcare Leaders](#)

Russell Group principles on the use of generative AI tools in education Our universities are committed to the ethical and responsible use of generative AI and to preparing our staff and students to be leaders in an increasingly AI-enabled world. The rise of generative artificial intelligence (AI) has the potential for a profound impact on the ways in which we teach, learn, assess, and access education. Our universities wish to ensure that generative AI tools can be used for the benefit of students and staff – enhancing teaching practices and student learning experiences, ensuring students develop skills for the future within an ethical framework, and enabling educators to benefit from efficiencies to develop innovative methods of teaching. Valuable work undertaken by organisations such as the Quality Assurance Agency for Higher Education (QAA) and Jisc has helped develop the sector’s understanding of the opportunities and considerations of generative AI ¹², and the Department for Education (DfE) has set out its position on the use of generative AI in the pre-university education sector ³. Russell Group universities have contributed sector-wide insight and have been proactively working with experts to revise and develop policies that provide guidance to students and staff. Collaboration, coordination, and consistency on this issue across the education and professional sectors – including professional bodies, schools, FE colleges and employers – will be crucial. In recognition of this, Russell Group universities have collectively developed the following principles that will guide the approach to generative AI tools across our universities and, we hope, beyond: 1. Universities will support students and staff to become AI-literate. 2. Staff should be equipped to support students to use generative AI tools effectively and appropriately in their learning experience. 3. Universities will adapt teaching and assessment to incorporate the ethical use of generative AI and support equal access. 4. Universities will ensure academic rigour and integrity is upheld. 5. Universities will work collaboratively to share best practice as the technology and its application in education

evolves. 1. Universities will support students and staff to become AI-literate. 1.1 Generative AI tools are capable of processing vast amounts of information to generate responses but they have significant limitations. It is important that all students and staff understand the opportunities, limitations and ethical issues associated with the use of these tools and can apply what they have learned as the capabilities of generative AI develop. These include: (a) Privacy and data considerations: whether a generative AI tool is designed to learn directly from its users' inputs or not, there are risks to privacy and intellectual property associated with the information that students and staff may enter. (b) Potential for bias: generative AI tools produce answers based on information generated by humans which may contain societal biases and stereotypes which, in turn, may be replicated in the generative AI tool's response.

(c) Inaccuracy and misinterpretation of information: data and information contained within generative AI tools is garnered from a wide range of sources, including those that are poorly referenced or incorrect. Similarly, unclear commands or information may be misinterpreted by generative AI tools and produce incorrect, irrelevant or out-of-date information. This means that accountability for the accuracy of information generated by these tools when transferred to another context lies with the user. (d) Ethics codes: users of generative AI tools should be aware that while ethics codes exist, they may not be embedded within all generative AI tools and that their incorporation, or otherwise, may not be something that users can easily verify. (e) Plagiarism: generative AI tools re-present information developed by others and so there is the risk of plagiarised content and/or copyright infringement being submitted by a user as their own, and artwork used by image generators may have been included without the creator's consent or licence. (f) Exploitation: the process by which generative AI tools are built can present ethical issues. For example, some developers have outsourced data labelling to low-wage workers in poor conditions⁴

. 1.2 Our universities will provide guidance and training to help students and staff understand how generative AI tools work, where they can add value and personalise learning, as well as their limitations. By increasing AI-literacy, our universities will equip students with the skills needed to use these tools appropriately throughout their studies and future careers, and ensure staff have the necessary skills and knowledge to deploy these tools to support student learning and adapt teaching pedagogies. 2. Staff should be equipped to support students to use generative AI tools effectively and appropriately in their learning experience. 2.1 Our universities will develop resources and training opportunities, so that staff are able to provide students with clear guidance on how to use generative AI to support their learning, assignments, and research. 2.2 The appropriate uses of generative AI tools are likely to differ between academic disciplines and will be informed by policies and guidance from subject associations, therefore universities will encourage academic departments to apply institution-wide policies within their own context. Universities will also be encouraged to consider how these tools might be applied appropriately for different student groups or those with specific learning needs. 2.3 Engagement and dialogue between academic staff and students will be important to establish a shared understanding of the appropriate use of generative AI tools. Ensuring this dialogue is regular and ongoing will be vital given the pace at which generative AI is evolving. 3. Universities will adapt teaching and assessment to incorporate the ethical use of generative AI and support equal access. 3.1 Universities continually update and enhance their pedagogies and assessment methods in response to drivers including new research, technological developments and workforce needs – adapting to the use of generative AI technology is no different. Incorporating the use of generative AI tools into teaching methods and assessments has the potential to enhance

the student learning experience, improve critical reasoning skills and prepare students for the real-world applications of the generative AI technologies they will encounter beyond university. 3.2 Appropriate adaptations to teaching and assessment methods will vary by university and discipline, and protecting this autonomy is vital. All staff who support student learning should be empowered to design teaching sessions, materials and assessments that incorporate the creative use of generative AI tools where appropriate. Professional bodies will also have an important role in supporting universities to adapt their practices, particularly in relation to accreditation. 3.3 As the technologies develop and new generative tools become available, elements of generative AI used within universities may reside behind paywalls or be restricted to paying subscribers. Universities will need to consider how best to respond to a potential proliferation of such subscription tools and attempt to ensure fairness of access so that students and staff can access the generative AI tools and computing resources they need in support of their teaching and learning practices. 4. Universities will ensure academic rigour and integrity is upheld. 4.1 All 24 Russell Group universities have reviewed their academic conduct policies and guidance to reflect the emergence of generative AI. These policies make it clear to students and staff where the use generative AI is inappropriate, and are intended to support them in making informed decisions and to empower them to use these tools appropriately and acknowledge their use where necessary. 4.2 Such clear and transparent policies are critical to maintaining consistent and high standards of learning, teaching and assessment across Russell Group universities. 4.3 Ensuring academic integrity and the ethical use of generative AI can also be achieved by cultivating an environment where students can ask questions about specific cases of their use and discuss the associated challenges openly and without fear of penalisation. 5. Universities will work collaboratively to share best practice as the technology and its application in education evolves. 5.1 Navigating this ever-changing landscape will require collaboration between universities, students, schools, FE colleges, employers, sector and professional bodies, with the ongoing review and evaluation of policies, principles and their practical implementation. 5.2 Our universities will regularly evaluate policies and guidance for staff and students relating to generative AI tools and their impact on teaching, learning, and assessment practices. This will include monitoring the effectiveness, fairness, and ethical implications of the integration of generative AI tools into academic life, and adapting policies and procedures to ensure they remain valid as generative AI technologies evolve. 5.3 Fostering relationships between higher education institutions, schools, employers, professional bodies who accredit degrees, AI experts, leading academics and researchers, as well as ensuring an inter-disciplinary approach to addressing emerging challenges and promoting the ethical use of generative AI, will be crucial. Russell Group universities recognise the challenges that lie ahead and will continue to value the input of others, along with contributing expertise to the national and international discussions around generative AI and its applications within teaching, learning, assessment and support.

[3. Chugai DX Meeting](#)

1. Progress in CHUGAI DIGITAL (Satoko Shisai: Executive Vice President, Head of Digital Transformation Unit) 2. Three Initiatives to Strengthen the Digital Platform (Keisuke Ohara, Head of IT Solution Department) (Kazumitsu Kanatani, Head of Digital Strategy Department) (1) Multicloud strategy/Cyber security strategy (2) Initiative toward utilization of generative AI (3) Initiative on healthcare × Web 3.0 3. Status of Progress in the Insight Business (Dr. Nobuya Ishii, Head of Science & Technology Intelligence Department)

Top Innovator 2030 ◡ Realization of Chugai's "Envisioned Future" in 2030 With world-class drug discovery capabilities, patients around the world expect that "Chugai will surely create new treatments." Attract passionate talent from all over the world, and inspire players in globally to think they can create something new by partnering with Chugai Recognized for its ESG initiatives through its business activities, Chugai will become a global role model as a leader in resolving social issues Our definition of "Top Innovator in the healthcare industry" In collaboration with Roche, we will continue to place "innovative new drugs" at the core of our business, while aiming to become a leading innovator in the global healthcare field, where a diverse range of players, not limited to pharmaceutical companies, are taking on the challenge of innovation.

Growth Strategy to Become a Top Innovator 2030 *RED: Research & Early Development Expansion of existing technological bases and building a new technological foundation to materialize unique drug discovery ideas Accelerating innovation opportunities by strengthening collaboration with leading global players and leveraging digital technologies Launch in-house global products every year by doubling R&D output Dramatic improvement in product / patient value by restructuring business model, having digital utilization as a core Improve productivity of entire value chain by leveraging digital technologies Commercialization of insight business with the aim of maximizing the value of pharmaceuticals and having a new business pillar Key Drivers ► DX ► RED SHIFT ► Open Innovation "Double R&D output" & "Launch global in-house products every year"

Reform Chugai's business through digital technology and become a top innovator that provides healthcare solutions that transform society Transform our business by using digital technologies to make Chugai a top innovator in the provision of society-changing healthcare solutions Society-changing healthcare solutions ∪ Provide optimal personalized healthcare suited to individuals. ∪ Produce high QoL throughout life through ultra-early diagnosis, prevention, and treatment. ∪ Bring about social assurance programs sustainable even in shrinking and aging societies. Transform our business ∪ Provide innovative drug products continuously by leveraging digital technologies. ∪ Greatly streamline all value chains. ∪ Create frameworks for providing innovative services. ∪ Change employee awareness and organizational structure and customs at Chugai.

Key Achievements So Far (1) 7 DX for drug discovery and development } Accelerate drug discovery research DX by utilizing AI, robotics, etc. → Select candidate antibodies for development through the use of AI technology in generating antibody molecular sequences and optimization (MALEXA) → Improve molecular design and screening methods for small/mid-size molecules through AI technology → Improve productivity in pathology through the use of image analysis technology. Use quantitative evaluation to perform integrated analyses → Develop robots to support work in complex experiments → Promotion in development of Lab Automation System and digital infrastructure } Promote development of digital biomarkers → Enter into new partnership agreement with Biofourmis for the continued development and practical clinical application of digital solutions to objectively evaluate pain in patients with endometriosis } Promote utilization of RWD in filing of regulatory application and internal decision-making → Filing of regulatory application: Use of RWD as evaluation data and reference data in the filing package for HER2-positive colorectal cancer → Utilization in internal decision-making: to survey actual treatment status of diseases, investigate prognosis predictions, and consider clinical study design, etc.

Key Achievements So Far (2) 8 Optimize all value chains } Promoting initiatives towards smart factories → Equip Ukima Plant with the following functions. (1) Automation and visualization of work plan drafting (2) Efficient assignment and utilization of human resources throughout the entire plant (3) Use of smartphones to enable remote support and tamper-proof image recording tools → Promote deployment to Fujieda Plant and Utsunomiya Plant } Promote updating of customer engagement model → Support sales, safety, and MA activities with a comprehensive platform that integrates customer databases and information on various solutions, and a decision-making support engine that utilizes AI. Accelerate improvement of operation results } Digitization of clinical trials: Promotion of DCTs → Start decentralized clinical trials (DCTs) incorporating visiting nursing and telemedicine into ordinary clinical trials in the US } Promote Reconsider Productive Approach (RPA) efforts → Initially aimed at reducing workload by 100,000 hours by 2023, but achieved 150,000 hours workload reduction by the end of 2022

Key Achievements So Far (3) 9 Strengthening the digital platform } Operation of the Chugai Cloud Infrastructure (CCI) → Unify the data provision functions in a multicloud environment (AWS/Azure/Google Cloud, etc.) to promote standardization, strengthen security governance, and achieve efficient integrated operations management → While using AWS as the main platform, use Google for AI/machine learning, etc. } Cyber Security → Formulate a cyber security vision and clarify issues to enhance cyder security and countermeasures. In addition to raising the overall level of security, various risk-based initiatives will be implemented, and security checks and security monitoring of business partners will be enhanced. } Acceleration of external collaborations and open innovation → Establishment of CVC: Begin approach to digital AI technology to support drug discovery and translational research → Digital Innovation Lab: Promoted more than 450 ideas and 80 PoCs in 3 years, and shifted more than 20 projects to actual development → Innovation Pitch (C-DIP): A pitch event will be held on 9/22 (scheduled to be held within the year in October and December) with the aim of promoting collaboration with start-up companies and revitalizing the entire industry

Key Achievements So Far (4) 10 Strengthening the digital platform } Launch & promote ASPIRE project → Introduction of state-of-the-art global standard processes and next-generation core business infrastructure (ERP), and promotion of company-wide operational process and organizational reforms } Promotion of data strategy → Accelerate the establishment of a governance/control system whereby anyone who needs to use data can easily find and obtain that data thanks to the establishment of an environment in which the desired analysis can be performed conveniently, together with the FAIR + culture/system } Launch of Web 3.0 initiatives → In October 2022, our company’s philosophy on Web 3.0 was announced as a Point of View. We will aim for new innovations by utilizing “DAO,” “DID,” “NFT/FT,” etc., based on blockchain technology } Promotion of utilization of generative AI → ChatGPT: Company-wide use started in August after various risk evaluations and guidelines were formulated → Acceleration of utilization for more advanced operations and promotion of evaluation of various types of generative AI

DX Brand: Selected as Grand Prix and Platinum Company ↴ The only pharmaceutical company selected for 4 consecutive years since 2020 ↴ In 2022, Chugai was selected to receive the “DX Grand Prix” as “a company that leads the digital era in a manner that transcends the framework of its industry” ↴ In 2023, Chugai was selected for the “DX Platinum Company 2023-2025” as a company that has continued to pursue outstanding DX initiatives since the inception of the system

1. Progress in CHUGAI DIGITAL (Satoko Shisai: Executive Vice President, Head of Digital Transformation Unit) 2. Three Initiatives to Strengthen the Digital Platform (Keisuke Ohara, Head of IT Solution Department) (Kazumitsu Kanatani, Head of Digital Strategy Department) (1) Multicloud strategy/Cyber security strategy (2) Initiative toward utilization of generative AI (3) Initiative on healthcare × Web 3.0 3. Status of Progress in the Insight Business (Nobuya Ishii, Head of Science & Technology Intelligence Department)

Cyber Security Vision 14 CHUGAI CYBER SECURITY VISION 2030 Become a cyber security leader to support the achievement of top innovator status in the healthcare industry
o Foster a security culture so that all employees throughout Chugai Global consider “Security First” to be a matter that concerns them personally
o Disclose a commitment to security in an outward-facing, proactive manner
o Construct a companywide governance system with a robust monitoring/escalation and feedback loop
o Construct a system that supports business and enhances security by having business and IT coordinate while retaining high degrees of specialization
o Construct a highly secure IT infrastructure base that enables secure use of data
o Achieve flexible and robust IT security to accommodate ecosystem expansion and change
People/Culture
Organizational management Technology
↓ Through internal and external environmental analyses, including CHUGAI DIGITAL VISION 2030, create a "vision and strategy" for cyber security by 2030

Establish a Cyber Security Management System 15 Construct a system to grasp security management information and implement vulnerability management in a timely and comprehensive manner
↓ Assign an officer to act as coordinator of the headquarters and bases and issue instructions and requests related to security
Report the results of security monitoring to the management every quarter and connect them to additional improvement activities
Governance layer
Management layer
Implementation layer
Stakeholders (customers, consumers, management, business, etc ...)
Formulation of cyber security plans and rules
Y Reflect plans and rules in business processes, documented procedures, and manuals
Y Cooperation in operation and implementation of cyber security management measures
Reporting
Monitoring
Evaluation
Ongoing monitoring and cyber security assessment
Management report
Formulation of Security Vision and Mission
Formulation of cyber security strategy
Report the status of implementation
Present plans and rules
Instructions to concretize
Head office and departments
System user
System owner
Digital Strategy Committee
Chairperson: DX Supervisory Officer
Deputy Chair: Head of DX Unit
IT Solution Department
Cyber security management roles
Y Role of hub between each headquarters/unit and ISOL Dept.
Y Coordinators for implementation of security measures
Governance
Cycle
Organizational chart of each layer
Plant/research base
System user
System owner
Overseas sites
Decision-making meetings attended by management
Security specialist
EUC
Promotion
C

Approach to Security Issues 16 +
• Create rules referring to best practices
• Regularly monitor compliance with rules
• Activities to correct gaps
Baseline approach
Risk-based approach
• Grasp risks specific to each case and system
• Grasp the latest trends in cyber attacks
• Implement individual measures for identified risks
Raise the overall security level
Address residual risk in the baseline approach

Baseline Approach 17
↓ Each site's security level is scored annually against the best practice collection
↓ Elevate the security level of the entire Group by establishing a baseline (security goals

for each fiscal year) for plants, research laboratories, and overseas bases and planning and implementing various measures to achieve it

Risk-based Approach 18 Check security risks at the time of system planning and modification (Catch up with cases in the budget drafting process) (1) Conduct risk assessment for information assets (Annual inventory of personal information ledger, occasional risk evaluation of human-derived data, etc.) (2) (3) Identify existential risks through regular penetration tests Continuous acquisition of information on the movements of advanced attackers (Using threat intelligence) (4) Systematically implement individual measures for risks identified at each level Respond appropriately to individual risks that cannot be grasped by the baseline approach (rules) alone ↓ Combine multiple approaches to proactively grasp overall risk ↓ Take appropriate individual actions according to the identified risks in a planned manner

Business Partner Security Initiatives 19 ↓ Check response to the security risks of business partners from 2 viewpoints: "security system/maturity level" and "technical vulnerability" ↓ On a trial basis, implement for about 70 of our important business partners Check of security system and maturity level Check of technical vulnerabilities Details of check Frequency of checking • Confirmation of the status of acquisition of certification such as ISMS* • Audit by our company, using checklist At the start of business + Periodically (e.g., annually) • Use of security rating services • Use of threat intelligence services • Use OSINT** to check from the perspective of attackers Occasional checks, as needed (Routine continuous monitoring) Business Partner Security Initiatives (Results) 20 ∪ Take action based on the results for "security system/maturity level" and "technical vulnerability" ∪ It will be necessary to establish a system for checking in cooperation with the business unit, risk management unit, procurement unit, and IT unit Upgrading of Security Monitoring 21 ∪ Promote to upgrade SOC/SIEM that is central to proactive security response Cyber Security Response System 22 ∪ Cooperate and share information within and outside the company in preparation for emergency ∪ In the event of an emergency, promptly set up a task team for early response and take company-wide action with the aim of minimizing damage Future Theme: Digital Service Security 23 ∪ It will be necessary to establish a security system that anticipates the provision of digital services to patients and healthcare providers (automatic drug delivery devices, digital biomarkers, smartphone applications, etc.). Why will the Cloud be Necessary? 24 Cost reduction Pay-as-you-go system that does not require an initial investment Elasticity No need for scale capacity forecast dependent on demand Higher security Robust security by specialist organizations Acquisition of various third-party international standards Agility Hundreds of thousands of servers can be deployed in minutes and shut down at any time Global-scale deployment Deploy worldwide in just a few minutes Broad range of functions Can utilize hundreds of state-of-the-art services, which are constantly evolving 6 + 1 be Why is a Multi-cloud Strategy Necessary? 25 Niche services/ Strengths and weaknesses Measures to simplify operations Mitigation of vendor lock-in and geopolitical risks Solution for increased costs A mixture of public cloud services that are carefully selected allows us to access featured services of the respective cloud vendors and niche or advanced services that are not available from other cloud services. A mixture of public cloud services that are carefully selected can help mitigate or reduce the risks of vendor lock-in. These risks include potential future price increases, service discontinuation by cloud vendors, as well as geopolitical risks that may lead to service outages and delivery delays. Multi-cloud environments do come with disadvantages, such as increased costs from not being eligible for volume discounts. However, by taking advantage of the Roche Group's blanket policy, we have reduced the costs. Also, by adopting the integrated cost management

(FinOps products), we can collectively manage costs across multiple clouds, minimize expenses by adjusting, suspending, or deleting resources while comparing costs among cloud services. Multi-cloud environments are often criticized for their complexity and increased operational burdens. However, when the same vendor handles both the design and operation, it allows for standardized and consistent operations without adding unnecessary complexity. Also, the use of integrated automation management (IaC products) allows us to reduce operational burdens. Leveraging the advantages of multi-cloud

Managing the drawbacks of multi-cloud Utilization and Challenges of our Cloud Infrastructure

- ┆ While we've pursued various measures for DX individually, further advancement of DX at an expedited pace should consider aspects like faster environment provisioning, enhanced security, standardized service utilization, and integrated infrastructure.
- Infrastructure silos** Each platform has its own infrastructure operation team resulting in operational inefficiency
- Environment provisioning** has a long lead time
- Different procedures per domain and individual optimization** make the lead time longer and the request process more complex.
- Inconsistent security levels** The platforms are being run individually, and governance is not easily attained due to their inconsistent security levels.
- Service standardization is difficult** It is difficult to standardize the commonly used infrastructure services because of their individualized configuration optimized for each (such as backup, patch, monitoring)

Overview of the CCI (Chugai Cloud Infrastructure)

- ┆ Start building the next-generation Chugai cloud infrastructure (CCI) by utilizing the knowledge of CSI construction
- ┆ Efficiently integrate the enterprise system platforms that have been configured on third-party cloud environments
- ┆ Centralize cloud infrastructure features for enhanced standardization and security governance
- ┆ Continuously improve and extend functionality to keep pace with technological advancements

Usage Guidelines for the CCI (Chugai Cloud Infrastructure)

- υ Chugai Cloud Infrastructure (CCI) uses AWS as the main cloud platform, with Microsoft Azure and Google Cloud as the sub cloud platforms.

Effectiveness of the CCI (Chugai Cloud Infrastructure)

- Speed (Agility)** Governance (Security/Control) Growing operation costs
- Environment provisioning** that used to take one month to complete can be done in 2 to 3 business days
- Governance and speed achieved together** through 'Detective Control'
- Operation cost reduction of 36%** through consolidation and automation/self-service

Promotion Policy for 2023

- 31 Introduction of ChatGPT and promotion of its utilization
- Promotion of utilization of generative AI (external solution) in each unit's operations
- Generative AI utilization strategy** for the creation of new value, and drafting of use cases

Direction 1 Direction 2 Direction 3

- ┆ 3 directions to be promoted for the time being

ChatGPT Utilization Status

- 32 Implementation status
- ┆ Construct the Chugai version of ChatGPT on Azure and implement PoC from May onward, with the objective of investigating use cases and risks
- ┆ Start company-wide deployment in August after establishing rules and procedures

Examples of utilization

- ┆ Create infrastructure within the internal environment, confirm use cases through trials, and promote company-wide utilization from August onward after formulating guidelines
- ┆ Identify the following 6 risks and formulate guidelines

Risk response

- Infringement of intellectual property and copyrights
- Leakage of personal information and confidential data
- Lack of credibility
- Biased output
- Use for unintended purpose
- Shadow AI
- Preparation of meeting minutes and action list
- Creation of various scenarios
- Questionnaire analysis
- Proofreading of various regulatory documents
- UMN initial search
- Extraction of information on laws and regulations
- RWD tabulation efficiency
- Code creation and programming explanation

Initial Use Cases

- 33 → Auto-search on scholarly paper databases using specific keywords
- Summarize the abstract of paper
- Share the abstract along with paper details (such as title, author, sources, abstract, link)
- Use case details → Automatically

generate code in Python or R to refine coding and streamline programming tasks → Input error-containing code in Python or other languages and display suggestions to correct the identified error. → Input code in Python, VBA, or other languages to identify the content and structure → Input survey results, including those from Google Forms, into GPT for analysis, which covers the entire process from comment aggregation/analysis to solution drafting → Based on knowledge compiled internally along with written text for a task, create structured data (e.g., duration, root cause classification, impact, solutions, etc.) ∪ Promote various initiatives for tasks that can be done with Chugai's ChatGPT ∪ Develop a platform for utilizing internal and external data and encourage diverse usages of data beyond text Retrieval of paper and abstract summary Streamlined programming Analysis of various text data Idea Types Frequently Requested in ChatGPT and Direction of Realization Preparation of draft internal and external explanatory materials and educational materials Create drafts of recruitment guidelines and questions Collection of regulations and trends at other companies Draft proposals for various applications and GxP documents, and proposals for modifications Cognitive searches Preparation of draft meeting minutes Preparation of draft emails Preparation of draft codes Translation/proofreading Summaries of papers Responding to various inquiries (Chatbot) Enable with "Add your data" function Realize by combining ChatGPT with other systems Streamline with ChatGPT and Microsoft Copilot Simplification of SOP search and document preparation Confirmation of how to use systems, equipment, software, etc. Already feasible Handle by DXU + each unit Infrastructure to be considered by DXU ∩ Promote utilization of ideas that can already be implemented ∩ Cognitive searches, etc., where the infrastructure is best considered by the entire company should be executed chiefly by DXU Organizing the Generative AI Development Structure 35 Value Creation/ Optimization Generative AI platform Promotion structure Knowledge acquisition through trial Preparation of guidelines for the generative AI usage and development Establishment of in-house development/ promotion structure Promotion/development support structure Enhanced capability for the development of generative AI Identification and collection of usable internal and external data Configuration of the app development platform Platform for data aggregation, document generation, molecular design and more Research Div. TR Div. Clinical Development Div. Development of generative AI that leads to new value creation Pharmaceutical Technology Div. ∪ Promote the development of generative AI to expedite R&D upon organizing a well-structured developer team and the generative AI platform Our Focus in the Generative AI 36 Time to value 4 drug discovery fields1 Identification of insights and support for decision-making Utilization in drug discovery Mining and utilization of latent knowledge within the company Research TR Clinical Development CMC Quickly streamline operations Comparison and proposal of multiple candidates Entire company Consistency between strategy and assets Other companies can make similar efforts, and these do not necessarily lead to competitive advantage unique to Chugai 1 3 2 Directly accelerate Chugai's unique R&D and contribute to the improvement of competitive superiority Gen AI at present Technically feasible Need to handle advanced knowledge and build Gen AI and peripheral systems ∩ Organize the needs of each unit from the perspective of the technical area that leads to competitive advantage and time to produce results ∩ (1) "Identification of insights and support for decision-making," (2) "Mining and utilization of latent knowledge within the company," (3) Improvement of operational efficiency Direction of our Action to Extract Insights and Support Decisionmaking in R&D 37 Research TR Clinical Development CMC Ensuring reusability of past findings Utilization for targeted molecule discovery · · · Present structured evidence, regardless of whether it is unstructured RWD or simple charts. Structuring unstructured data · ·

- Proposal of clinical study design and development plan
- • • Generation of synthetic processes
- • • Study design assistance
- Creation of clinical study documentation and FAQ
- Creation of request form, report and review support

∪ We encourage utilization in R&D from the following perspectives: Changes in the Web 3.0 ∟ Web 3.0 is a new concept of the Internet since 2020. The key point is that data is distributed and managed by each system/individual, and that individuals directly connect with each other without relying on gigantic IT companies

Key Elements of Web 3.0 - Blockchain-related elements (FT, NFT/DID/DAO) 40 ∟ The main elements of Web 3.0, such as “DAO,” “DID,” and “NFT/FT,” are based on blockchain technology

What is Web 3.0? (Chugai’s Interpretation) 41 ∟ Web 3.0 will change ideas about the ideal states of “personal data sovereignty,” “organization/community,” and “‘space’ for value creation,” and realize a world in which “individuals” play the leading role

Healthcare Worldview Created by Web 3.0 ∟ Through Web 3.0, a world in which each stakeholder in the healthcare field will receive benefits is realized, and the values to be provided in that world can be broadly classified into 4 categories (A to D). Web 3.0 × Healthcare Worldview (realization image) ∟ Web 3.0 × Healthcare worldview will be realized through new use cases created by Web 3.0

Example of Realization Image: Research DAO ∟ Accelerate innovation creation through formation of DAO mainly from collaboration/idea emergence and fair distribution toward the NFT-ization of IPs and contributions

Rigorous protection and fair operation of intellectual property

- Protection of intellectual property through the utilization of digital evidence
- Visualization of contribution activities by token
- Promotion of diversity in co-creation
- Promotion of diversity in research participants
- Encouragement of patient/company involvement

Issues Incentive/rule design Because the organization operates autonomously, it is unclear where Concern over understanding and handling of responsibility lies when a problem occurs intellectual property related regulations (e.g., balance between work and research) Acceleration of innovation creation

- Increase researcher motivation through fair incentives
- Insight creation through new collaboration

Roadmap for Realizing Chugai’s vision ∟ First, we will strengthen our platform, expand applicable use cases by making the value chain more efficient, and ultimately promote the use of Web 3.0 toward crucial “revolutionization of the drug discovery process.”

Acquisition of capabilities and creation of initial results Social implementation of a new mode of healthcare

Expansion of scope and results Phase 1 (up to 2025) Phase 2 (up to 2030) Phase 3 (2030 and beyond)

Relationship to Chugai Vision Innovative new drug creation Optimize value chains

Strengthening the digital platform Provide innovative services } Create initial case - DAO (e.g., internal DAO) - Token economy - Metaverse - Manufacturing digital twin } Understand requirements - Biological digital twin Democratization of healthcare data ownership Transformation of collaboration Revolutionize the drug discovery process Construction and Operation of Internal DAO 46 Overview of DAO Concept Name of DAO Objectives A “place ” where each and every employee can play the leading role and demonstrate their personality and identity Is free and open communication promoted? • “Anonymity” unfettered by department or position • “Visual design” that supports the display of individuality and identity Is it possible to display autonomous intent and visualize degree of contribution? • “Voting function” that makes it possible to express one’s own will • “Engagement score” to quantify the actions of individuals, such as posting ideas or commenting Verification of “valuation of ideas” through tokens “NFT-ization” that manages promising ideas through BC • Issuing of “Chugai internal coin (FT)” that assigns value to NFT-ized ideas Concept of Deployment of Internal DAO 47 ∟ Aim to dynamize new value creation by making ideas spawned by DAO into projects Overview of LABORN

Activities and Feel of Use 48 ↓ While enhancing the feel of use, posting ideas on specific themes and discussing them Examples of topics discussed • Because of anonymity, participation without conjecture is possible, and the hurdles for posting are lowered • I felt free to speak up, and it was easy to make a comment at the “just an idea” level • I felt good that I could make proposals beyond the scope of my usual work, and I could indicate that I agreed with other people's proposals. • It was interesting because I was able to post content that I wouldn't have been able to talk about in my usual work. Visualization of contribution → Calculate individual contribution by engagement score and display ranking on site Next Step 49 Internal DAO (LABORN) External DAO (Development of new services, drug discovery, etc.) Action in FY2023 ↓ Company-wide deployment ↓ Continuation of LABORN as new communication space Planning and execution of the first project FT-related policy design (Linking benefits/distribution to individuals, etc.) Formulation of the DAO operation policy (Legal positioning of DAOs and tokens, handling of IP and privacy data, etc.) Organization and structure planning Work requirements definition and design System requirement definition, system design/configuration Seek involvement of community members ↓ Start the first phase of external DAO operation ↓ Design and plan the second phase operation Planning and execution of the second project UI improvements Action in FY2024 and beyond Seek availability of new external DAO ∪ For the internal DAO, define and promote projects initiated by DAO ∪ For the external DAO, proceed with the work/system requirement design and configuration in preparation for the first phase of operation Insight Business From the new special website on growth strategy “TOP I 2030” • Business aiming to provide sustainable medical solutions to improve the value of providing drugs, etc. to patients and other stakeholders Concept Solutions •App •Device, etc. Data •Drug discovery •Non-clinical •Clinical studies •RWD (1) Build an insight creation cycle (2) Commercialization by providing solutions. Meaningful quantitative data Advanced analysis Insights Solutions based on insights Patients Pharma Companies Medical Institutions The core business of Chugai is to provide innovative pharmaceuticals, and that remains unchanged. However, as a response to an era in which we are being called upon to provide value that goes beyond the “creation of innovative drugs,” we are working on improving the value proposition by providing solutions that utilize insights obtained from the analysis of various data. W Develop insights obtained from in various businesses such as pharmaceutical R&D activities into solutions to reaprocesseslize a value cycle that leads to (1) maximization of pharmaceutical value, (2) simultaneous generating MDAS* through continuous data acquisition, and (3) creation of new insights I Scope of Efforts in the Insight Business 55 Basic principles Direction of approach • Focus on patients and pain in medical institutions/systems, considering Chugai's competitive advantage and synergy with the pharmaceutical business • Deployment of solutions from Roche in Japan • Development of solutions related to products created by Chugai, utilization in clinical development, and post-launch deployment • Decision support • Clinical (healthcare providers, patients): CDS • R&D (for companies, including Chugai): RDS • Remote Patient Monitoring (RPM) • Clinical (healthcare providers, patients) • R&D (for companies, including Chugai) Efforts toward Integrated Solutions at Roche 56 What is an integrated solution? Examples of efforts • Generic term for a non-product-dependent solution that leads to improvement of the value delivered to patients through a patient journey • Early + accurate detection • Timely diagnosis • Remote disease monitoring • Individually tailored care/interventions • Remote monitoring of patients with multiple sclerosis (MS) via smartphone app • Remote monitoring of patients with ophthalmologic diseases via smartphone app • Remote monitoring of cancer patients via smartphone app • Support for analysis of radiological images and pathological images of cancer patients Efforts in the Insight Business at

Chugai 57 TOP I 2030: One of the growth foundation reforms Examples of efforts • With the goal of establishing a business system for the insight business by 2030, we will work on verifying technologies and effects through individual use cases, reexamine our internal system, and establish a model for collaboration with external parties. Decision-making support Remote monitoring Endometriosis • Diagnostic imaging • Pain Cancer • Foundation medicine business • Prognosis prediction • Early diagnosis • Adverse events/ prognosis Hemophilia • Asymptomatic hemorrhage • Motor function Eye diseases • Eye function Activity goals for the insight business Contribution to pharmaceutical business Exploration phase Up to 2023 Technology verification through individual use cases Verification of effects and expansion of scale by application to multiple projects Verification phase 2024 to 2026 Establishment of a business structure that will enable continuous creation and sustained delivery of insights Commercialization phase 2027 to 2030 ► Maximization of insight utilization ► Acceleration of drug R&D with data/insights gained through insight business-related activities Example of Efforts in the Insight Business: Endometriosis What is endometriosis? Anti-IL-8 recycling antibody • 10% of adult women are affected • A disorder in which tissue similar to the "endometrium" covering the inside of the uterus forms outside the uterine cavity • One of the causes of infertility. Frequency of occurrence is low, but can be one of the risk factors for ovarian cancer • Major symptoms include pain due to adhesion and inflammation and worsening of menstrual pain. Major treatment methods include hormone therapy and other pharmacotherapy, as well as surgery (nonradical) • Issues: • Non-invasive diagnostic imaging • Quantitative evaluation of pain • Currently under development for endometriosis Predisease Diagnosis Treatment Prognosis #1 Diagnostic imaging #3 Virtual Care Platform #2 Pain measurement 58 Mode of action of anti-IL-8 recycling antibody Anti-IL-8 recycling antibody Neutralizes the effects of IL-8 fibrosis Fibrosis in endometriosis Transformation into myofibroblasts • high contractility • Production of extracellular matrix • α -SMA expression Neutrophil migration induced by IL-8 MCP1 production by IL-8 \uparrow Macrophage migration by MCP1 Bleeding/ inflammation IL-8 production \uparrow Macrophage accumulation in fibroblasts, TGF β 1 production \uparrow Neutrophil Macrophage IL-8 MCP1 TGF β 1 Bleeding and inflammation in endometriotic tissue \rightarrow IL-8 production Drawing from Sci. Transl. Med. 15(684):eabq5858 Figure S5 Inf Efforts in the Insight Business, Case #1 59 Issues in imaging diagnosis of endometriosis Efforts - Current diagnosis: Definitive diagnosis by endoscopy, which is highly invasive, is required. Diagnostic imaging is difficult to adjudicate, and evaluation differs greatly among evaluators. - Variability in efficacy assessment in clinical studies - Efforts to develop models for detecting pelvic organ and nodal lesions by artificial intelligence (collaboration with Preferred Networks) Efforts in the Insight Business, Case #2 60 Issues in pain measurement Efforts - Large variation in subjective evaluation - Variability in efficacy assessment in clinical studies - Development of continuous pain measurement technology using digital devices (collaboration with Biofourmis) - Mechanism of pain in endometriosis: autonomic nerves - Vitals related to autonomic nerve pain: heart rate fluctuation, skin conductance (1) Visual analog scale (VAS) No pain Use 10 cm scale The worst pain imaginable 100 No pain The worst pain imaginable (2) Numeric rating scale (NRS) (3) Face rating scale (FRS) Japan Chronic Pain Information Center <https://itami-net.or.jp/download> (Access: September 26, 2023) Created by Chugai Pharmaceutical with reference to and citation of pain education content data for medical education. 0 1 2 3 4 5 6 7 8 9 10 A B C D E F Biofourmis's Biovitals™ Platform Pain Algorithm Biovitals® Pain Index Mobile app Femme Rhythm™ App Objective Pain Measurement Using a Wearable Biosensor and a Mobile Platform in Patients With Endometriosis The E4 wristband <https://www.empatica.com/research/e4/> (Access: September 27, 2023) Empatica's E4

Wearable Biosensor Efforts in the Insight Business, Case #3 61 Issues in the delivery of solutions Efforts - Need to build access infrastructure to deliver solutions to patients and medical institutions - Efforts to deliver solutions through the virtual care platform that Biofourmis provides to medical institutions - Development of a virtual care platform that enables real-world pain measurement - Small-scale provision of virtual care for patients with endometriosis in the U.S. - Find insights from data gathered from platform to support Chugai R&D on endometriosis and post-launch activities for the endometriosis drug candidate under development Future Issues - Regulatory compliance (medical device regulations, personal information protection, etc.) - Acquire capabilities to appropriately protect personal information and comply with various regulations depending on where the solution is deployed (Japan, overseas) - Involvement of relevant stakeholders (patients, healthcare professionals/medical institutions, etc.) - From the solution development stage, we consider the benefits to various stakeholders and build solutions that can provide services sustainably. - Knowledge accumulation - Improve efficiency by accumulating knowledge through creating solution development examples. ' Aiming to commercialize an insight business that realizes the provision of sustainable solutions based on insights to further improve the value provided by pharmaceuticals. ' By developing solutions from insights obtained from pharmaceutical R&D activities and other business processes, we aim to realize a value cycle that leads to (1) maximization of pharmaceutical value, (2) simultaneous construction of MDAS* through continuous data acquisition, and (3) creation of new insights S

4. [Daiichi Sankyo's Challenge to Realize: 2030 Version](#)

Russell Group principles on the use of generative AI tools in education Our universities are committed to the ethical and responsible use of generative AI and to preparing our staff and students to be leaders in an increasingly AI-enabled world. The rise of generative artificial intelligence (AI) has the potential for a profound impact on the ways in which we teach, learn, assess, and access education. Our universities wish to ensure that generative AI tools can be used for the benefit of students and staff – enhancing teaching practices and student learning experiences, ensuring students develop skills for the future within an ethical framework, and enabling educators to benefit from efficiencies to develop innovative methods of teaching. Valuable work undertaken by organisations such as the Quality Assurance Agency for Higher Education (QAA) and Jisc has helped develop the sector's understanding of the opportunities and considerations of generative AI 12 , and the Department for Education (DfE) has set out its position on the use of generative AI in the pre-university education sector 3 . Russell Group universities have contributed sector-wide insight and have been proactively working with experts to revise and develop policies that provide guidance to students and staff. Collaboration, coordination, and consistency on this issue across the education and professional sectors – including professional bodies, schools, FE colleges and employers – will be crucial. In recognition of this, Russell Group universities have collectively developed the following principles that will guide the approach to generative AI tools across our universities and, we hope, beyond: 1. Universities will support students and staff to become AI-literate. 2. Staff should be equipped to support students to use generative AI tools effectively and appropriately in their learning experience. 3. Universities will adapt teaching and assessment to incorporate the ethical use of generative AI and support equal access. 4. Universities will ensure academic rigour and integrity is upheld. 5. Universities will work collaboratively to share best practice as the technology and its application in education evolves. 1. Universities will support students and staff to become AI-literate. 1.1 Generative AI tools are capable of processing vast amounts of information to generate responses but they have

significant limitations. It is important that all students and staff understand the opportunities, limitations and ethical issues associated with the use of these tools and can apply what they have learned as the capabilities of generative AI develop. These include: (a) Privacy and data considerations: whether a generative AI tool is designed to learn directly from its users' inputs or not, there are risks to privacy and intellectual property associated with the information that students and staff may enter. (b) Potential for bias: generative AI tools produce answers based on information generated by humans which may contain societal biases and stereotypes which, in turn, may be replicated in the generative AI tool's response. (c) Inaccuracy and misinterpretation of information: data and information contained within generative AI tools is garnered from a wide range of sources, including those that are poorly referenced or incorrect. Similarly, unclear commands or information may be misinterpreted by generative AI tools and produce incorrect, irrelevant or out-of-date information. This means that accountability for the accuracy of information generated by these tools when transferred to another context lies with the user. (d) Ethics codes: users of generative AI tools should be aware that while ethics codes exist, they may not be embedded within all generative AI tools and that their incorporation, or otherwise, may not be something that users can easily verify. (e) Plagiarism: generative AI tools re-present information developed by others and so there is the risk of plagiarised content and/or copyright infringement being submitted by a user as their own, and artwork used by image generators may have been included without the creator's consent or licence. (f) Exploitation: the process by which generative AI tools are built can present ethical issues. For example, some developers have outsourced data labelling to low-wage workers in poor conditions⁴.

1.2 Our universities will provide guidance and training to help students and staff understand how generative AI tools work, where they can add value and personalise learning, as well as their limitations. By increasing AI-literacy, our universities will equip students with the skills needed to use these tools appropriately throughout their studies and future careers, and ensure staff have the necessary skills and knowledge to deploy these tools to support student learning and adapt teaching pedagogies.

2. Staff should be equipped to support students to use generative AI tools effectively and appropriately in their learning experience.

2.1 Our universities will develop resources and training opportunities, so that staff are able to provide students with clear guidance on how to use generative AI to support their learning, assignments, and research.

2.2 The appropriate uses of generative AI tools are likely to differ between academic disciplines and will be informed by policies and guidance from subject associations, therefore universities will encourage academic departments to apply institution-wide policies within their own context. Universities will also be encouraged to consider how these tools might be applied appropriately for different student groups or those with specific learning needs.

2.3 Engagement and dialogue between academic staff and students will be important to establish a shared understanding of the appropriate use of generative AI tools. Ensuring this dialogue is regular and ongoing will be vital given the pace at which generative AI is evolving.

3. Universities will adapt teaching and assessment to incorporate the ethical use of generative AI and support equal access.

3.1 Universities continually update and enhance their pedagogies and assessment methods in response to drivers including new research, technological developments and workforce needs – adapting to the use of generative AI technology is no different. Incorporating the use of generative AI tools into teaching methods and assessments has the potential to enhance the student learning experience, improve critical reasoning skills and prepare students for the real-world applications of the generative AI technologies they will encounter beyond university.

3.2 Appropriate adaptations to teaching and assessment methods will vary by university and discipline, and protecting this autonomy is vital. All staff who support

student learning should be empowered to design teaching sessions, materials and assessments that incorporate the creative use of generative AI tools where appropriate. Professional bodies will also have an important role in supporting universities to adapt their practices, particularly in relation to accreditation. 3.3 As the technologies develop and new generative tools become available, elements of generative AI used within universities may reside behind paywalls or be restricted to paying subscribers. Universities will need to consider how best to respond to a potential proliferation of such subscription tools and attempt to ensure fairness of access so that students and staff can access the generative AI tools and computing resources they need in support of their teaching and learning practices. 4. Universities will ensure academic rigour and integrity is upheld. 4.1 All 24 Russell Group universities have reviewed their academic conduct policies and guidance to reflect the emergence of generative AI. These policies make it clear to students and staff where the use generative AI is inappropriate, and are intended to support them in making informed decisions and to empower them to use these tools appropriately and acknowledge their use where necessary. 4.2 Such clear and transparent policies are critical to maintaining consistent and high standards of learning, teaching and assessment across Russell Group universities. 4.3 Ensuring academic integrity and the ethical use of generative AI can also be achieved by cultivating an environment where students can ask questions about specific cases of their use and discuss the associated challenges openly and without fear of penalisation. 5. Universities will work collaboratively to share best practice as the technology and its application in education evolves. 5.1 Navigating this ever-changing landscape will require collaboration between universities, students, schools, FE colleges, employers, sector and professional bodies, with the ongoing review and evaluation of policies, principles and their practical implementation. 5.2 Our universities will regularly evaluate policies and guidance for staff and students relating to generative AI tools and their impact on teaching, learning, and assessment practices. This will include monitoring the effectiveness, fairness, and ethical implications of the integration of generative AI tools into academic life, and adapting policies and procedures to ensure they remain valid as generative AI technologies evolve. 5.3 Fostering relationships between higher education institutions, schools, employers, professional bodies who accredit degrees, AI experts, leading academics and researchers, as well as ensuring an inter-disciplinary approach to addressing emerging challenges and promoting the ethical use of generative AI, will be crucial. Russell Group universities recognise the challenges that lie ahead and will continue to value the input of others, along with contributing expertise to the national and international discussions around generative AI and its applications within teaching, learning, assessment and support.

5. [How to get ChatGPT regulatory approved as a medical device](#)

The advent of ChatGPT and similar large language models (LLMs) has created unprecedented excitement for their application in medicine. Advocates of the technology are imagining a wide range of clinical utility, from clinical note-taking to diagnostic tools and beyond. During the initial splurge of hype it can be easy to get carried away with futuristic thinking, while pragmatists and sceptics will only be more validated as the limitations and risks of such models become more widely acknowledged and addressed. However, there will eventually be a path that emerges that brings us closer to successfully applying this groundbreaking technology to medicine, and that's what we're going to explore in this blog.

Is it even possible?

First, let's begin with the bad news. ChatGPT (and other models like it) can not be used safely in medical practice in their current form. They are prone to [hallucination](#), [bias](#), and can produce extremely plausible sounding misinformation. As such large language models are far better suited to generating creative rather than factual output. Additionally, they aren't necessarily compliant with data protection laws such as GDPR and HIPAA, a number of [cybersecurity risks present themselves](#), and there is little to no information publicly available on how they were built, trained and validated so no effective quality assurance can be conducted. To rely on them in medicine would likely be illegal in most jurisdictions, violating professional standards, clinician codes-of-conduct, medical device regulations and patient data protection laws. Even allowing them to be used for general medical search and queries could land their developers in trouble, as according to [Haupt et al](#) they could be liable for medical misinformation, as well as setting up litigation issues for clinical end users who may rely on plausible sounding, non-standard misinformation to make clinical decisions.

You might be thinking, what about Google search? Yes, doctors use the internet of course, but general systems such as those are protected under laws such as [Section 230 of the 1996 Communications Decency Act](#), and as such have no regulatory burden when it comes to processing medical queries, since the content provided is from third parties (each with their own liability). ChatGPT and the like are [not protected](#) since they do not disclose the sources of third party information ingested into their training, and are self-contained systems which act as far more than “a passive transmitter of information provided by others”.

Where to start

So, how could you go about demonstrating compliance for a medical large language model? It's certainly not going to be easy, and currently most likely impossible, but we can at least explore what this might look like in the future by learning from current regulatory frameworks and ongoing active research into AI safety.

Define the problem

Before even starting to think about approving an LLM for medical use, take a step back and define the problem you are trying to solve. Blindly adopting the newest technology for the sake of it does not equate to creating an [economically valuable solution](#). Taking radiology AI as an example from the 2010s, there is still uncertainty of how the use of these computer-vision tools translates into [economic value](#) for healthcare providers and systems.

Defining your [unmet clinical need](#) and subsequent [business case](#) is more important than ever in the turbulent economic climate of 2023. With [funding continuing to slow](#) and investors prioritising near-term profitability over the promise of longer term potential, it's crucial to demonstrate how generative LLMs will solve the problem in an economically viable way. Once you've accomplished this, you're ready to start the product development and regulatory journey.

Intended Use

The starting point for any new technology in medicine is to define its [intended use](#) in order to a) decide if it is a medical device or not, in which case it requires regulatory approval in the form of FDA approval, a CE or UKCA mark as Software as a Medical Device (SaMD) or more specifically AIaMD, and b) what risk class and special controls are required. The intended use statement informs performance and safety requirements, as well as defining end users, clinical indications,

clinical and operational context, and importantly, reasonably foreseeable misuse. Let's pick an example that has been widely discussed - providing a differential diagnosis to a doctor based on a patient consultation.

As part of the overall intended use for such a device, indications for use may be written as:

“MedGPT is intended for use by qualified medical practitioners in the context of outpatient clinical consultations with patients aged over 18 for any clinical condition that is not immediately life threatening or critical. MedGPT provides a top three differential diagnosis based on clinician-derived prompt inputs, basing its outputs on data from a curated general medical knowledge database, real-time structured data from the patient record combined with consultation transcriptions. MedGPT is not intended to be used in emergent care, paediatrics, obstetrics, or psychiatry and its outputs should assist with clinical decision making only, not drive management or be relied upon for formal diagnosis.”

This statement clearly sets limits on who can use the device, in what context, and for what clinical conditions in a limited adult population. The full intended use document would need to be [much more detailed](#), but this is a good starting point for our theoretical example. You can already see that we have had to significantly limit the potential of the language model to a predefined target use case of clinical decision support for a given clinical population with limited scope and severity of conditions. This example is indeed a medical device, and will require regulatory approval.

Risk Classification

Next, we would have to determine the risk classification of this device. Based on the [MDCG risk classification guidance](#) this device would likely be Class IIa in the UK and EU, since it is intended to inform clinical decision making. The UK regulator, [the MHRA is clear on this point](#) -

“A device is considered to ‘allow direct diagnosis’ when it provides the diagnosis of the disease or condition by itself, it provides decisive information for making a diagnosis, or claims are made that it can perform as, or support the function of, a clinician in performing diagnostic tasks.”

Indeed, predicate devices such as [Ada Assess](#) are CE marked as Class IIa.

Treating or diagnosing

EU Class III

Critical risk for patient

EU Class IIb

Serious risk for patient

EU Class IIa

Non-serious risk for patient

Driving
management

clinical

EU Class IIb

EU Class IIa

EU Class IIa

Informing
clinical management

EU Class IIa

EU Class IIa

EU Class IIa

Note that if further claims are made such as treating or diagnosing, then the risk classification can easily fall into class IIb or III, which require a higher burden of regulatory oversight. Currently CADx (diagnostic) systems in the United States of America are likely to be Class III, so it is important that we temper our intended use to clarify it is intended for clinical decision support only. Additionally, since this is novel technology, the FDA may require a De Novo submission, which has a longer timeline and greater regulatory scrutiny than a standard 510(k) submission that is used to leverage already existing substantially equivalent devices that are FDA approved.

Defining our requirements

Next, we'll need to define the requirements for our medical large language model. What are the parameters in which we want it to operate, associated claimed benefits, performance benchmarks and safety requirements? In medical device regulation, there are essential requirements, and then product specific requirements. The [essential requirements](#) (also known as general safety and performance requirements) include the elimination of risk to the maximum extent possible for the duration of the lifetime of the device, appropriate design of electronic programmable systems and general requirements regarding labelling and product information (think instruction manuals and user information). Performance requirements depend on the claims being made - so we would need to demonstrate a valid clinical association that a medical LLM system can provide factually correct clinical diagnostic differential (which is currently hard to prove). We also need to decide on appropriate clinically measurable metrics, often based on the results and outputs of a [systematic literature review](#) specifically conducted to explore current state of the art, as well as technological benchmarks. Our Literature Review should be reported to [PRISMA standards](#). All of this feeds into what is known as a Benefit Risk Analysis, which again feeds back into your requirements stack, alongside a Product Requirements and Risk Register managed within an ISO 13485 certified [Quality Management System](#). We'll also need to consider operating environment requirements, systems connectivity, architecture and data security. There's a lot to do!

A theoretical system

Let's look at architecture next, since we can't test something until we actually have something to test. Research in this space is moving fast, with many groups working on improving the reliability and safety of large language model outputs. Taking example from [Microsoft's work](#) into building a fact checking system incorporating an LLM, external knowledge and automated feedback, a sensible starting point may look something like this:

View fullsize

Here we have a third-party LLM connected by API which receives prompts guided by a custom prompt engine linked to a data retriever which can access a curated medical knowledge base. Some form of rules-based module controls the system to prompt, receive feedback, store or read memory or retrieve data. The system is designed to automate feedback so that LLM responses can be fact checked against the medical knowledge base, and sent back to be refined if not deemed factual when compared to knowledge extracted from the medical knowledge base. The memory module ensures all data in the flow is stored and informs the system so it improves rather than deteriorates in response quality. The rules-based module, with a series of pre-programmed IF>THEN logic could disallow queries relating to our exclusions (e.g. obstetrics, critical care), as well as function as a prompt guide rail to ensure LLM responses are returned in a specific format.

Let's assume this set up works in a test environment (a feasibility study), and provides more verifiably factually correct outputs than current unprocessed LLM outputs. The entire system architecture will have to be designed and documented within an appropriate [Software Development LifeCycle](#) to [IEC 62304](#) and [82304-1](#) standards, and verified as cybersecure to at least [ISO 27001](#), while also being GDPR and HIPAA compliant. That's a lot of technical documentation to go into your [Medical Device File](#).

3 major hurdles

Our challenge will now be to verify and validate each component of our system, and demonstrate that it works in the real world. [Software verification and validation](#) may be relatively simple under current regulatory frameworks for most of our system modules except for the medical knowledge base and of course, the LLM itself.

Validating a curated medical knowledge base

The knowledge base would by necessity need to be curated and validated, and this is where the first major hurdle lies. Even if we could ingest the entirety of medical literature, not all medical information is up-to-date, accurate or relevant to all locations. Papers can be biased, results can be outdated, and guidelines broken in a myriad of ways. Disease prevalence, population demographics and best practice guidance all differ across the world, and as such curating a database that is fit for purpose within our intended use will be extremely challenging. Additionally, access to all this information will be expensive if we aim to be comprehensive, and not all of it is machine-readable. However, let's assume it's somehow possible to curate, vet and validate such a large database, and move on to consider the third-party LLM.

Software of Unknown Provenance

Currently, access to LLMs such as ChatGPT are by API only. The developers have not made public any documentation as to how it was built, trained or maintained as these details remain a trade secret. This is our second major hurdle, known as SOUP, or Software of Unknown Provenance. This means that if we cannot verify or validate a piece of third party software according to [IEC 62304](#), we cannot claim to have mitigated all risks, since it could for instance be changed without warning (the current status quo will not stay still for long!), or be withdrawn from market making our system unable to function. The [UK regulators are clear on this position](#), but that doesn't mean that all hope is lost. As LLM technology becomes more accessible, developers will start building their own versions, and it may be that in due course someone will produce one with the required

documentation (perhaps like [Med-PaLM](#)). Until then, we won't see a regulatory approved system that uses an LLM at its core.

Analytical and Clinical Validation

Probably the largest hurdle will be to demonstrate the clinical evidence required to prove that the system is safe and effective for all cases within our intended use. Assuming we can set a benchmark of non-inferiority to clinician diagnostic differential performance, we would need to run a [clinical investigation](#) to [ISO 14155](#) standard, with ethical approval, appropriately powered to achieve statistically relevant performance metrics, with enough room left over to analyse the almost infinite sub-stratifications of cases, all done to the [STARD-AI criteria](#). We're talking about the mother of clinical investigations.

Ground-truthing the sheer number of potential cases for the clinical investigation will be a challenge in itself, likely requiring a form of independent panel-approved vetting of clinical input scenarios and data, expert group opinion on acceptable outputs, and a robust system for fact-checking, ranking or rating final system outputs. Checks would need to be in place for 'red flag' cases, and to make it even more difficult, our system ideally should not be changed or tweaked for the duration of the investigation.

If we wanted to claim that our system actually helps clinicians reduce time spent making decisions, we would also need to run an investigation to prove it, ethically approved and appropriately registered, comparing current clinical practice without AI to a new pathway with AI, and measure the differences. We should use best practice guidance such as [SPIRIT-AI](#) and [TRIPOD-AI](#) depending on our claims and intentions. This would not necessarily need to be in a randomised-control fashion, but could require investigation of two matched groups of clinicians with matched cases across two powered cohorts (again, no mean feat!).

Technically, none of this is impossible, but it will require a significant amount of time and expertise to pull off. Ultimately, all of our clinical evidence, from literature review, feasibility studies, clinical evaluation plan (CEP), clinical investigation plans (CIPs) and reports (CIRs) will need to be compiled into a regulatory compliant [Clinical Evaluation Report](#) (CER). Of course, regulatory approval will entirely depend on our investigation actually showing positive results, so fingers crossed it actually works as planned.

Putting it all together

Let's assume that we have managed to overcome all of the above hurdles, and have ended up with a fully documented [Software Development LifeCycle](#), [Clinical Evaluation Report](#) and have compiled a [Medical Device File](#). The process simplified to its core components looks like this:

[View fullsize](#)

Ongoing monitoring

You'll note we haven't covered everything in the above diagram for the sake of brevity, but one essential component will be post market follow up. It's important to acknowledge that once our device is 'on market' (i.e. being made available for use as per its intended use), there is a legal requirement for us to monitor its performance and safety for the duration it remains on market.

This is done both proactively and reactively in two components known as [Post Market Surveillance](#) and [Post Market Clinical Follow Up](#). At the most simplistic level we will need to predefine our ongoing surveillance, including all complaints and feedback, as well as declaring our methodology for ongoing clinical assurance, which could be further clinical investigations and powered studies (to demonstrate performance across subgroups where we haven't fully been able to demonstrate safety pre-market) or ongoing sampled audits. Do not underestimate the magnitude of this challenge - imagine having to audit potentially billions of input/output pairs forever and act accordingly for all errors and adverse events. The results of the post market surveillance must be incorporated back into our [Clinical Evaluation Report](#) and reported annually to the regulators. We'll also need to update our [Literature Review](#) annually to check for any studies done on our device, and to assess performance and safety issue issues of other similar devices. If we don't maintain these processes, then our device could be removed from market.

Getting regulatory approval

Now the fun begins. Hopefully, way back at the start we engaged with a regulatory body who is going to audit our work and certify us. This could be the FDA directly, or a [UK Approved Body or EU Notified Body](#), or any number of country-specific competent authorities, depending on which geographies we want to deploy our system into clinical care. Each audit will come with fees (think tens of thousands) plus a nice long time delay (think months to years) before an audit can actually be performed. Assuming we pass audit, we receive our market authorisation, and we are almost there. We just need to appoint an appropriately qualified [Person Responsible for Regulatory Compliance](#), [register our device](#), produce appropriate labeling and instructions for use, and then start selling it! If we want our system to be used in multiple countries, we may also consider upgrading our Quality Management System to pass [MDSAP](#) standards, giving us entry into multiple markets. Although, caution here - we will need to prove it works in multiple languages too, and will additionally need to re-run our clinical investigations in each of our target countries to demonstrate it works on different populations with different disease prevalences, clinical guidelines and benchmark performances.

Updating our system

One tiny detail we haven't yet mentioned is that current regulatory frameworks do not allow for continuous updating of software and AI-based medical devices. That's going to be a problem... not only will our LLM be changing regularly, but our system self-feeds back to improve factual accuracy. None of that is straightforward under current regulatory frameworks - but hope is on the horizon. The FDA, Health Canada and the UK MHRA are all working on [Predetermined Change Control Plans](#) (PCCPs) to allow for safe, quality-assured ongoing updates of software devices as long as they remain within the confines of their regulatory-cleared intended use. We don't yet know when these frameworks will be finalised, but at the time of writing there is a [public FDA consultation](#) on the subject. In essence, developers will be able to submit plans to update software over time, but they must stick to those plans and not deviate from them, or change their intended use, otherwise a new regulatory submission may be required.

Other considerations

We haven't covered many other important aspects of the regulatory journey in great detail here, as our hope is simply to inform the interested reader of the general procedures and frameworks when

it comes to AI as a Medical Device. We should however make note of the following topics, some of which are still in flux and subject to change:

[Cybersecurity for AI driven devices](#)

[Health informatics standards](#)

[Explainability of AI devices](#)

[Formative usability testing](#)

[Human centred design](#)

[Bias detection and mitigation](#)

[Algorithmic change protocols](#)

[AI framework standards](#)

[Functional safety](#)

[The EU AI Act](#)

Conclusion

So there we have it - a roadmap for how to get a medical large language model-based system regulatory cleared to produce a differential diagnosis. It won't be easy or for the faint-hearted, and it will take millions in capital and several years to get it built, tested and validated appropriately, but it is certainly not outside the realms of future possibility.

To put it all in context, we can vividly remember when deep learning first exploded around 2012 and it took approximately five years before the first regulatory approved AI-driven device came on market (that was one of Dr Harvey's, a [CE marked Class IIa decision support system for breast mammography](#)). Now there are over 500 of AI-enabled devices with regulatory approval!

There is one big BUT in all this that we feel compelled to mention. Given the lengthy time to build, test, validate and gain regulatory approval, it is entirely possible that LLM technology will have moved on significantly by then, if the current pace of innovation is anything to go by, and this ultimately begs the question - is it even worth it if we are at risk of developing a redundant technology? Indeed, is providing a differential diagnosis to a clinician who will already have a good idea (and has available to them multiple other free resources) even a good business case?

In reality, these risks are simply a fact for all medical devices, as innovation always moves forward, and risks need to be weighed against the potential benefits of improving patient care in the near term. We are excited to see where this goes, and of course, our [team at Hardian](#) are ready, willing and able to help anyone who dares go on this adventure into the unknown. Consider yourself warned. You know where to find us.

Hardian Health is a clinical digital consultancy focused on leveraging technology into healthcare markets through clinical evidence, market strategy, scientific validation, regulation, health economics and intellectual property.

6. [AstraZeneca data and AI ethics](#)

Ethics at the core of our data and artificial intelligence ambitions

Rapid advancements in the field of artificial intelligence (AI) are revolutionising the pharmaceutical industry. At AstraZeneca, these advances have already begun to change the way we work in several business areas. AI systems can help us improve our supply chain when delivering medicines, design smarter trials and better understand diseases, and match patients with the right clinical trials by creating [biological insight Knowledge Graphs](#). AI tools, including generative AI technology, have the potential to do this and much more, creating opportunities for us to push the boundaries of science to deliver life-changing medicines. Our foundational ethical principles are supporting our ambitions for the future of AI at AstraZeneca.

Our principles for ethical data and AI

Rapid developments in AI technology have brought us into uncharted territory, and companies and regulators must work together to meet the new challenges posed. Our principles empower us and our partners to navigate this new environment safely and effectively. By encouraging innovation and evolution while maintaining our values, they provide a long-term ethical foundation for our AI work to benefit patients and employees and enable us to make a positive contribution to society.

Explainable & transparent

We are open about the use, strengths and limitations of our data and AI systems.

We explain to people if they are interacting with an AI system and whether interactions are recorded.

We are able to explain when and how AI is used to aid a decision that impacts humans.

We will ensure appropriate levels of explainability and transparency in line with our legal obligations.

We will ensure our assumptions are clear, we will ensure algorithms are appropriately documented, decisions are explainable as needed, and processes are in place to deal with unanticipated impacts.

We can demonstrate the legitimacy of our data sources, and how models are trained and maintained.

We have the ability to explain processes, data and algorithms when required to do so while protecting our intellectual property.

We are transparent about the use of AI to build trust and credibility in all our endeavours.

*Explainable refers to the ability of humans to understand the results of a solution generated by Artificial Intelligence

Fair

We endeavour to use robust, inclusive datasets in our Data and AI systems.

We seek to ensure our use of AI is sensitive to social, socio-geographic and socio-economic issues, and protect against discrimination or negative bias to the best of our ability.

We will continually adapt and improve our AI systems and training methods to drive inclusiveness.

We treat people and communities fairly and equitably in the design, process, and outcome distribution of our AI systems.

We are aware of the limits of our AI systems. We strive to apply their outputs in the right context and in a non-discriminatory fashion.

We monitor our AI systems to maintain fairness throughout their lifecycle.

We acknowledge all data sources and human effort in our Data and AI Systems, while protecting our intellectual property. We aim to use ethically sourced AI tools and partners.

Accountable

We apply governance proportional to the impact and risk of our Data and AI Systems.

We diligently assess risk against opportunities to act consistently with our company values.

We take accountability of our use of Data and AI Systems throughout their life cycle, so their use is appropriate and monitored over time.

We anticipate and mitigate the impact of potential unfavourable consequences of AI through testing, governance, and procedures.

We are accountable for our findings and the recommendations from AI systems. We govern AI-supported decisions appropriately.

We recognise and address unforeseen consequences resulting from our AI usage appropriately, and ensure that lessons are learned.

Human-centric and socially beneficial

Where Data and AI is involved, humans oversee the system and are accountable for driving clear, expected benefits to people and society.

We apply AI to contribute to a sustainable workforce, business, and planet, to help make AstraZeneca a Great Place to Work, and accelerate our contribution to society.

We involve people at appropriate times to responsibly deploy AI where decisions carry a material impact. We harness the capabilities of AI to accelerate the development and delivery of the right life-changing medicines to the right patients with the right commercial potential.

We employ human-led governance over our AI systems. We respect human dignity and autonomy and strive to reflect this in our AI systems.

We drive prudent and sustainable energy consumption when using Data and AI systems.

We recognise that protecting the environment is an integral part of ensuring AI systems are socially beneficial. We aim to reduce the energy consumption of our AI systems in line with our [Ambition Zero Carbon](#).

Private and secure

We respect privacy and control, and act in a manner compatible with intended data use.

We respect privacy and the rights of all stakeholders, and will act in accordance with relevant laws and regulations.

We assign appropriate protective measures to keep all information held or generated by AstraZeneca's AI systems secure.

We employ Data and AI systems that are designed to be secure.

We strive to protect our AI systems against information breaches and unintended applications, with mitigation processes in place. We manage our AI systems through their life cycle, including information used and generated.

We review third party AI providers' data protection standards to seek alignment, and comply with applicable law.

[7. Procaps participate in panels on digitalization and artificial intelligence in pharma manufacturing](#)

Procaps Group to Participate at CPHI Barcelona 2023

Rhea-AI Impact

(Low)

Rhea-AI Sentiment

(Neutral)

Tags

conferences

Rhea-AI Summary

Procaps Group announces participation at CPHI Barcelona 2023

Positive

Procaps Group will participate at CPHI Barcelona 2023, showcasing their specialized technologies and capabilities.

Procaps is one of the five sustainable sponsors at the event, highlighting their commitment to sustainability.

Gonzalo Nieto, head of Innovation and ESG, will present a panel on sustainability.

PhD. Joe Villa, head of Corporate R&D, will participate in panels on digitalization and artificial intelligence in pharma manufacturing.

Negative

None.AD

10/16/2023 - 08:31 AM

MIAMI & BARRANQUILLA, Colombia--(BUSINESS WIRE)-- Procaps Group (NASDAQ: PROC) (“Procaps”), a leading integrated LatAm healthcare and pharmaceutical conglomerate, announced today that it will participate at the CPHI Barcelona 2023, that will take place from October 24th to October 26th, continuing with our two-decade presence in the conference.

We welcome you to learn more on our specialized technologies and capabilities such as our novel oral delivery system formulations, gummies, development of new chemical entities, expertise in hormonal, high potency compounds, as well as successful product tech-transfers, and much more.

We are pleased to announce our participation as one of the five sustainable sponsors at CPHI Barcelona this year. Our sustainable approach is seen in different areas of our business, including in our own technologies, such as Unigel. This patented format allows the development of fixed-dose combinations in one single softgel, reducing environmental waste by decreasing the number of packaging material used when manufacturing two products or more in one single format, rather than individually. This technology creates a large positive environmental impact and an even larger footprint on health by simplifying treatments with Unigel.

One of Procaps’s executive – Gonzalo Nieto, head of Innovation and ESG, will present the panel "Getting Started with Sustainability – Learn from the Experts" at the CPHI, in Barcelona, on October 25.

In addition to that, with our 8 manufacturing plants across the Americas and our extensive manufacturing capabilities, exclusive delivery systems and product development expertise, we will participate on another panel. PhD. Joe Villa, head of Corporate R&D of Procaps, will participate in the speaking session of “How digitalization is driving efficiencies, cost-savings, and output for drug manufacturing”, on October 25 and also will present the panel “Loading Potential: Artificial Intelligence for Pharma Manufacturing”, on the same day.

We look forward to welcoming you to our booth #3M40. For more information about CPHI, please visit: <https://europe.cphi.com/europe/en/home.html>

About Procaps Group

Procaps Group, S.A. (“Procaps”) (NASDAQ: PROC) is a leading developer of pharmaceutical and nutraceutical solutions, medicines, and hospital supplies that reach more than 50 countries in all five continents. Procaps has a direct presence in 13 countries in the Americas and more than 5,500 employees working under a sustainable model. Procaps develops, manufactures, and markets over-the-counter (OTC) pharmaceutical products and prescription pharmaceutical drugs (Rx), nutritional supplements and high-potency clinical solutions.

8. [1DOC3: ACCESSIBLE HEALTHCARE TO MILLIONS](#)

Background

1Doc3 (pronounced “uno doc tres”) is an online health platform that allows millions of Spanish-speaking users to ask health-related questions and receive professional medical guidance in real-time using artificial intelligence (AI). In addition, it provides data to health insurers and

pharmaceutical companies to let them reach customers more efficiently. Furthermore, 1Doc3 is free and allows users to remain anonymous. It receives around \$2 million in funding from investors like Wayra, TheVentureCity, Mountain Partners and Mountain Nazca.

The platform, which can be downloaded on computers and mobile devices, keeps a database of over 400 licensed doctors who are recruited, trained and monitored, ensuring that patients receive answers from the most qualified professionals. These doctors build their reputation online by providing personalized answers to users for free. This type of access is convenient, free and anonymous and allows users to make more informed choices regarding their health and wellbeing.

Helping Its Users

1Doc3 has served over 490 million [Spanish-speaking users](#) in 120 countries, 53 percent of whom are below 34 years old. Over 60 percent of the questions asked by these younger users are related to sex. While these types of questions may normally be too embarrassing to ask in person, the anonymity of 1Doc3 allows young patients to receive the right medical guidance and even provides coupons for products like condoms.

The platform uses AI to help these users navigate towards relevant information. For example, if a user were to ask a question related to their back pain, AI would ask where the pain is “above or below,” and if it is a “stabbing pain.” The personalized and innovative service is highly sought after and has even earned itself a partnership with Internet.org, a system that brings connectivity to users in places where internet access is spotty at best.

Helping Insurance Companies and Pharmacies

There is also a commercial aspect to 1Doc3. The platform’s AI serves as a data collecting module. Over 70 million questions are asked each year and this makes the database extremely informative. With this information, health insurers can provide cheaper treatment to patients by eliminating the necessity to physically go to a physician’s office – in fact, users save an average of 11 percent on treatment when they use 1Doc3.

The platform also helps medical insurance and pharmaceutical companies identify patients for rare diseases. For example, 1Doc3 helped a client pharmaceutical company find patients who were suffering from ankylosing spondylitis, which is a relatively rare and difficult to diagnose. 1Doc3 identified back-pain along with the presence of three or four other symptoms to seek out those suffering from ankylosing spondylitis and provide resources for treatment. In this case, it connected patients to pharmaceutical companies who could provide the right medication and professional care.

The Future of the Health Industry

1Doc3 is described by Javier Cardona as a pocket-size doctor who is available to users at any time and provides integrated solutions to health issues. Although the bulk of its users are in Colombia, Mexico, Argentina and Peru, the administrative team is planning to expand globally and provide these capabilities to users all over the world.

While other healthcare platforms may also provide medical information to users, it is not always personalized. 1Doc3 is a revolutionary free service that changes the face of healthcare by connecting patients to doctors in a timely manner and pointing users in the right direction. It

removes barriers like time, cost and inaccessibility and puts the health back in the hands of the user.

– Julian Mok

9. [Artificial Intelligence at CSL](#)

When CSL assembled last year at its Data Science Summit in Bern, Switzerland, the company brought together participants from every aspect of its operations, from Finance to Pharmacometrics.

With data science and artificial intelligence playing an ever-increasing role, Global Head of Digital Transformation and Execution Systems Karen Etchberger posed a question relevant to all: “How do we move from where we are today to a future where we can bring this ambition to life?”

John Thompson, CSL’s Global Head of Advanced Analytics and Artificial Intelligence, is helping to lead that effort. Thompson has been on the forefront of artificial intelligence and its use in business for more than 30 years. He has helped build analytic systems for giants of global industry like Coca-Cola, Anheuser-Busch and Dell. Now, he’s doing the same for CSL.

“This company has grown tremendously and has been making smart moves along the way,” Thompson said. “Now it’s really starting to see the value of data and analytics.”

Developing a Data Science Framework

CSL is taking a two-pronged approach that includes a Center of Excellence and a Community of Practices on advanced analytics and AI, Thompson said. Data scientists are part of both groups and working on numerous projects throughout CSL. The setup ensures each project is the right one to address individual team needs while benefitting CSL as a whole.

“There’s a lot do,” Thompson said. “My days go from dawn to dusk every day and I feel as energized as I did when I started in the morning. It’s an exciting time to be here.”

Artificial intelligence and machine learning can be used to comb through vast sets of data to find outliers or similarities that can illuminate understanding of any number of scenarios. Like other global industries, Thompson said the company will be using artificial intelligence to improve supply chain efficiency and to comply with regulatory and legal requirements.

Making AI Work for Patients

But CSL also wants to use those powerful engines to solve the burdens faced by patients with rare and serious diseases. A major goal in CSL Behring’s AI push is to shorten the amount of time between the onset of symptoms for a patient and an accurate diagnosis. In Pharmacovigilance – the front lines of patient safety - robotics process automation can speed the flow of information and improve operational efficiency, said Richard Wolf, Executive Director, Global Clinical Safety and Pharmacovigilance.

Wolf says his team is also working with others across industry to find areas where AI and natural language processing can be utilized to ensure crucial information is readily surfaced, One day, he believes it could even serve to predict risks associated with certain medications.

“We do think there is a place for artificial intelligence in our work,” Wolf said. “And we’re taking a careful and thoughtful approach toward implementing it.”

Analytics can also help CSL uncover important medical insights from vast amounts of “real-world data,” such as physician notes in a patient’s chart. [Real-world data](#) are obtained outside of randomized controlled trials and generated during routine clinical practice. Prior to advanced analytics and AI, this information existed but it was difficult to gather and analyze.

Haley Kaplowitz, Executive Director & Global Head of Safety Sciences, is leading an organization-wide effort to employ analytics as a key tool for gaining real-world evidence to be used in decision-making across the product life cycle.

Both real-world data and real-world evidence are playing an increasing role in healthcare decisions, particularly from regulatory authorities and payers. They may also help predict patient groups at increased risk of adverse events and demonstrate product effectiveness and differentiation in the marketplace, Kaplowitz said.

“The industry is under increasing pressure to provide evidence and demonstrate the value of products to multiple stakeholders, particularly in actual clinical practice,” she added. “Real-world evidence is inherent to reach this goal and increasingly crucial to ensure patient access and commercial success.”

[10. Artificial Intelligence in Africa’s Healthcare: Ethical Considerations](#)

AI IN THE HEALTHCARE SECTOR Globally, the most critical issue in healthcare is providing overarching and effective treatment options that improve standards of living. The World Health Organization (WHO) has developed a five-year strategic plan for reaching public-health targets, as outlined in the Sustainable Development Goals (SDGs). In 2019, the WHO introduced the “triple billion” targets for global health, i.e. universal healthcare, health emergency protections, and overall better health outcomes for one billion 2 people across the world. AI-centric solutions can help achieve these goals by increasing access, improving quality and reducing costs. Developments in AI will drastically improve health services, diagnostics and personalised medicine. Various initiatives are already employing basic technology applications to provide essential healthcare services, for example, to expectant and nursing mothers. These are particularly relevant in the context of African healthcare, where the technology currently being used can easily incorporate AI-based solutions. For example, Safermom is a Nigerian start-up that empowers pregnant women and new mothers to make informed decisions by using low-cost mobile technologies (two-way SMS, voice calling, and mobile apps) 3 to transmit vital health information. In addition to improving direct patient care, AI can maximise supply-chain efficiencies, reduce administrative tasks, and streamline and improve life-saving compliance measures. It can also generate new capabilities for safeguarding against public-health epidemics that plague the most vulnerable populations, e.g. the containment of dengue fever or the prediction of birth asphyxia using 4 a mobile phone. Moreover, real-time access to maternal newborn healthcare data can be used to swiftly identify and respond to childhood diseases, malnutrition or related challenges. Despite countless benefits, however, the application of AI is vulnerable to pitfalls. The current AI-powered health systems suffer from an absence of accurate datasets and the uneven management of sensitive health data. To be sure, the most significant ethical violations are not rooted in

malicious intent, but in a lack of awareness of appropriate AI practices and safeguards. Stakeholders, including government and international organisations, are attempting to incorporate and implement safeguarding measures, with ethics as a central tenet of the AI framework. Using data from the United States (US) as a reference, it is known that cancelled appointments can be costly to doctors. A 2013 cross-university study estimated that the cost of no-show appointments per doctor in the US was US\$725.42 per day. This is calculated based on an average daily patient count of 24 patients per doctor, with an 18 percent baseline no-show rate. Thus, individual practices suffer an annual loss of over US\$182,000. A direct relationship between this data and Africa is perhaps most appropriate with respect to cities in the continent. In addition, however, it can be applicable to Africa's rural areas. These regions suffer from physician shortages, with patients frequently unable to see highly in-demand doctors. If transportation is expensive or difficult, for INCREASING ACCESS Artificial Intelligence in Africa's Healthcare: Ethical Considerations ORF ISSUE BRIEF No. 312 1 SEPTEMBER 2019 3 demand rural doctors, the issues will not only be financial but loss of human life. AI solutions are making a headway in addressing these challenges. For example, the Nigerian company DokiLink helps patients book doctor's appointments by creating personal calendars for doctors and their aides. The platform also provides means for doctors to collaborate and exchange information concerning medical questions. The founder, Dr. Niyi Osamiluyi, says that AI will "help expand the capacity and capabilities of healthcare providers, especially in the areas of 6 radiology and pathology." Medical appointments can often be timeconsuming, inconvenient and physically demanding for patients. Geography and economic restraints can limit access for both rural and urban residents, e.g. patients living in remote mountainous regions or those living in urban areas with little access to transportation. In cases where specialised medical professionals and equipment are required, AI-based telemedicine technology can bridge borders, overcome language barriers and address economic constraints. AI has the potential to offer patients unfettered access to specialists around the globe and allow for unprecedented coordination between professionals. With an increase in mobilephone-based applications, emerging markets can also benefit, notwithstanding the network and infrastructure challenges. For example, Novartis has partnered with Vodacom South Africa to connect community health workers 7 to doctors through mobile technology. AI is becoming increasingly instrumental for the early detection of diseases, which allows IMPROVING QUALITY for more accurate diagnoses, reducing instances of misdiagnosis and the resulting health and cost burden to patients. Datasharing amongst health professionals provides doctors with myriad case studies to inform diagnoses and allow for in-depth analyses of previous studies. This can give physicians a foundational understanding of many illnesses, even without significant prior exposure. In addition to enhanced diagnostic procedures, AI-enabled technologies can provide superior treatment options. Improving the quality of healthcare systems is beneficial for not only patients but also physicians, nurses and ancillary 8 professionals. According to Athenahealth, physicians spend an average of "40 percent of their time processing thousands of administrative documents and forms and chasing down hundreds of missing lab and 9 imaging orders." Automation of processes such as cataloging charts, filling prescriptions and transcription services can ease the burden placed on medical professionals and yield positive externalities for patients. In the context of unstructured medical data, however, it is necessary to have sophisticated natural language processing algorithms. Since much of the technology is currently being developed in Western or Asian contexts, transferring them to the African markets may prove challenging. The technology must be adaptable to the local language, to allow for modifications based on different languages, language structures and even speech accents. Moreover, the medical situations themselves may be

vastly different, e.g. different types of diseases and healthmanagement systems. Artificial Intelligence in Africa's Healthcare: Ethical Considerations 4 ORF ISSUE BRIEF No. 312 1 SEPTEMBER 2019 While the uptake of any new system is a challenge that requires various incentive structures, African countries have demonstrable interest. Dr. Osamiluyi says that the use of AI in medical cases in Nigeria will "help to alleviate the lack of human resources for health, poverty and epidemiological transition of disease burden. It will help in primary care by making patient diagnosis 10 faster and more accurate." According to Deloitte's 2019 Global Healthcare Outlook, many public health systems across the globe are still financially unable to address "accessibility (imbalanced distribution, including a rural-urban divide), affordability (especially for patients with low economic status), awareness (of lifestyle diseases, risk factors, vaccinations), absent or inadequate infrastructure and skilled human resources." Global spending is slated to grow at an annual rate of 5.4 percent until 2022, a notable increase from the 2.9 percent in the 12 last five years. Similarly, government healthcare spending is increasing at an average annual rate of 6.7 percent in West Africa and 4.5 percent in Southern Africa. Despite these efforts, the 2017 report by the World Bank and WHO indicates that half of the world's population do not have access to essential health services, with health expenses causing 13 100 million people to live in extreme poverty. The integration of AI into the healthcare space can help check the rising medical diagnosis costs, making treatments more affordable. Nigeria has developed a system called Apmis, which allows healthcare data to be shared and exchanged easily by hospital REDUCING COSTS owners, healthcare professionals, caregivers, patients and other stakeholders. It allows for easy, transparent, secure and low-cost data14 sharing. Another successful case is Kenya Medical Supplies Agency and IBM's Watson, which are engaged in a pilot project to transform healthcare supply chains. Users can interact with AI through various platforms, including SMS, computer and voiceover data, to improve healthcare logistics such as communication, sending medical records, and 15 appointment updates. AI-assisted technologies are expected to save the global healthcare industry 16 approximately US\$150 billion a year by 2026. Accenture estimates that the top costs savers will come from "robot assisted surgery (US\$40 billion), virtual nursing assistants (US\$20 billion), administrative workflow assistance (US\$18 billion), fraud detection (US\$17 billion), dosage error reduction (US\$16 billion), connected machines (US\$14 billion)" 17 and similar tools. By 2021, the market for AI in healthcare is expected to reach US\$6.6 billion, with an annual growth rate of 40 18 percent. The telemedicine market for virtual appointments is expected to become a US\$1.49-billion industry by 2025, an annual 19 growth of nearly 20 percent. Thus, the role of AI is crucial in reducing healthcare costs, fostering innovation and creating positive economic output. Access to Data For AI to function properly, it needs massive amounts of data. If the data is flawed or biased, to begin with, the result will also be CHALLENGES Artificial Intelligence in Africa's Healthcare: Ethical Considerations ORF ISSUE BRIEF No. 312 1 SEPTEMBER 2019 5 flawed. Thus, the collection and monitoring of the training datasets that go into an AI algorithm are major challenges in AI use in healthcare. For the integration of ethics in AI, it is crucial to ensure the collection of unbiased, accurate data. In April 2019, the AI Now Institute published a study on gender, race and power in AI, calling out the lack of diversity in AI 20 workplaces and the bias in technologies. Public and private organisations alike are now taking notice of this problem. For example, facial recognition has become a hugely controversial technology because it tends to provide lower standards of recognition for African faces compared to Caucasian ones. This is likely the result of systems using training datasets that are primarily composed of Caucasian faces. Medical research can also produce false results if it fails to capture the nature of the whole of a population being treated. For example, symptoms of heart attacks in

women present differently than in men. Current medical research datasets tend to focus on men. As a result, existing datasets on heart attacks, for instance, may not be as accurate for women. Similarly, health issues may change significantly across nations and ethnicities. Such variance has been observed in genetic disorders or genetic predispositions (e.g. diabetes is more prevalent in African American communities than in the US), disease prevention (e.g. a European disease prevention programme may not prioritise water-borne illnesses), and medical infrastructure (e.g. the AI system anticipates a state-of-the-art operating room rather than a basic medical facility in rural Lesotho.) Throughout history, key thought leaders have commented on the development of new forms of technological systems. Harvard Professor Jonathan Zittrain articulated how the generative internet and such systems are facilitating new kinds of control. Timnit Gebru, cofounder of “Black in AI,” has similarly discussed the diversity crisis in AI systems. Harvard Professor Cass Sunstein has written about how social technologies impact governance and society as well as how AI algorithms can be used to overcome the pitfalls of cognitive biases. For AI to work in the African healthcare sector, native researchers must be involved in the development of new technology, with African datasets informing such development. Any import of foreign AI technology must be done with awareness of its development process and limitations. Policymakers should have transparency into the algorithms and some understanding of the data supporting them. African datasets should be made available to researchers and companies working with imported AI tech, to ensure locally applicable outcomes. Since AI can only deliver what it has learnt, human engagement is necessary to ensure that the learning is unbiased and holistic. For policymakers, this means striking a balance between data access and personal privacy, and ensuring that African data is incorporated in AI development. Protecting Sensitive Data Personal health data—genetic information, biometric indicators such as fingerprints, a person’s HIV status—is often assigned the highest level of regulatory privacy protections. Data privacy and security are key to the Artificial Intelligence in Africa’s Healthcare: Ethical Considerations 6 ORF ISSUE BRIEF No. 312 1 SEPTEMBER 2019 implementation of AI-based medical technologies, both for compliance purposes and public trust in these solutions. The breach of sensitive data can pose a serious threat to public safety, and the efficient and accurate treatment of patients. Any company leveraging AI techniques in healthcare must be particularly attuned to the data-regulation norms and the management of sensitive patient data, to avoid legal and ethical impropriety. Current data regulation standards for sensitive healthcare vary widely across regions. The European Union (EU), for instance, passed the comprehensive dataprotection law, General Data Protection Regulation (GDPR), in 2018; the US’ Health Insurance Portability and Accountability Act (HIPAA) handles treatment specifically for medical information. Laws protecting personal data are being developed across Africa, including in Kenya, Morocco, Nigeria and South Africa. While there is still a long way to go, some best practices can minimise the vulnerability of sensitive data, e.g. the anonymisation of all datasets used in algorithms, distributed ledgers, multifaceted cybersecurity systems, encryption during storage and transmission, proper destruction of identifying information, data facility security, and targeted investment in IT infrastructure. Accountability Accountability mechanisms when managing healthcare information can promote integrity and durability in AI systems. By approaching AI systems with measured diffidence, a company can implement checks on the AI algorithm to reduce biases and promote holi s ti c ana l y s e s . A s tudy by the biopharmaceuticals company Syneos Health found one of the primary public concerns facing AI systems to be the “lack of human oversight and the potential for machine errors 21 leading to mismanagement of their health.” The following are some examples of current ethical checks. These can highlight best practices for accountability: 1 Cross-Sector Research Efforts: In

2018, the EU-backed EU High-Level Expert Group on Artificial Intelligence, which included industry professionals, non-governmental agencies and scholars, released a guidance note concerning AI Ethics. The AI-HLEG is a European Commission-backed working group comprising representatives from industry, 22 academia and NGOs.

2. Industry - Led Ethical Principles: Entrepreneurs and major technology companies, such as Elon Musk, Peter Thiel, Sam Altman, Infosys, Microsoft and Amazon, have created a joint non-profit AI-research company called Open AI.

3. Multilateral Cooperation: The International Telecommunication Union (ITU) and the WHO have partnered to create a Focus Group on AI, aiming to establish standards and guidelines for AI-based methods in the healthcare sector. On 4 May 2020, the ITU will hold their fourth annual workshop on AI for Good Global Summit, connecting innovators with problem owners for sustainable development. The ITU is an Africa-friendly forum, which may present opportunities for African AI researchers and innovators, as well as related healthcare experts.

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In recent years, there has been increased global endeavour to establish basic principles of the ethical use of AI and accountability. However, current regulatory approaches to this field of technology remain mostly in the philosophical realm. Since this aspect of technology development is without precedent, there is little basis for formulating regulations. Moreover, the need to strike a careful balance between allowing technology growth and ensuring accountability, renders inadequate most of the current proposals. The GDPR brought many issues regarding data regulation to the forefront: how to ensure data privacy for individuals; the role of government in the regulation of technology; and the best ways to effectively and ethically leverage big data. AI systems have been subject to sectorspecific laws or subject-specific guidelines on a haphazard and piecemeal basis—such as dataprotection acts, cyber-security laws, antidiscrimination regulations—creating large regulatory gaps. However, fuelled by concerns regarding the ethical implications of AI usage, countries are now beginning to explore AI-specific guidelines and regulations. With the increased use of AI to perform tasks, analyse data and create new systems, regulations have begun to emerge. The public sector is catching up to these discussions of control, monitoring and bias. Nations are participating in the rapid development of AI and its best practices. The most significant geographies, in this regard, include the EU, the US, Singapore and Dubai; there are also some key international organisations.

CRAFTING A POLICY

EU The EU released the “Ethics Guidelines for Trustworthy AI” in April 2019, through a highlevel expert group on AI. The guidelines state key principles that AI systems should abide by, including respect for human autonomy, prevention of harm, fairness and explicability. For holding up these principles, it recommends seven key requirements, such as human agency, oversight, privacy, data governance, diversity, non-discrimination and fairness. The guidelines appropriately link the ethical discussion to the broader discussion surrounding data protection and privacy.

US Under President Donald Trump's Executive Order on AI, the National Institute of Standards and Technology has been tasked with creating a plan regarding federal standards for deploying AI technologies, produced on 10 August 2019. NIST solicited public comments to formulate the plan. The guide is focused on minimising vulnerability to attacks from bad actors, encouraging innovation, and promoting public confidence in AI. Singapore Singapore has released a framework on how AI can be ethically and responsibly used. It is intended to be a living document, evolving new perspectives and challenges emerge. Certain articles in the framework suggest a nuanced understanding of the challenges with aggregating data and preserving human autonomy. Article 3.6, for instance, acknowledges that individuals live in their unique societal contexts and recommends

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BRIEF No. 312 | SEPTEMBER 2019 that organisations operating in multiple countries consider differences in societal norms and values. Article 3.7 states that some risks to individuals may only manifest at the group level. However, there should be caution against adopting the stance that ethics and norms are overly subjective. The document allows corporations to decide their own ethics, in turn creating scope for the kind of subjectivity that will fail to establish ethical norms in AI. Dubai The Smart Dubai Office created the new Ethical AI Toolkit, which provides counsel to individuals and organisations offering AI services. Notably, the toolkit recommends making AI systems explainable, attempting to eliminate the “black box” issue surrounding them. It also suggests carefully examining whether the decision-making processes introduce bias. While the document offers some good high-level guidelines, it falls short on describing how such values should be implemented. Multilateral Organisations International organisations are eager to include AI-related topics in their agendas, work-plans and research topics. Around mid2020, the Organisation of Economic Cooperation and Development (OECD) is preparing to release AI guidelines, at a ministerial meeting and the International Telecommunications Union (ITU) is set to hold its third high-level “AI for Global Good Summit.” Other organisations active in this space include the World Intellectual Property Organisation, which recently issued a major report on AI; and the WHO, which is not only issuing its own report but also collaborating with the ITU to form a “focus group” on the topic; and the International Labour Organisation, which has a workstream on the “future of work.” While these discussions can seem detached from the national regulatory processes, they promise to be powerful platforms that shape norms and set acceptable parameters for national policymakers looking for guidance. Technology continues to evolve at a rapid pace, and AI-related progression will only accelerate that change. To successfully integrate AI into the healthcare industry, governments must aim to create regulations that promote ethics by design, i.e. including checks and balances into the systems that utilise AI. It is also important to define what these systems should contain and how the development process is structured. Moreover, issues of human agency and bias must be considered while creating the algorithms. As with all cost-benefit analysis, however, regulators must weigh the impact of regulation against the stifling of innovation. This brief recommends keeping in mind three key concepts: 1. Not all AI is the same. There are very different kinds of applications and uses for AI in healthcare. Regulations must take these differences into account and not impose a blanket prohibition on AI use. Further, issues of ethics, trust and fairness must be addressed in conjunction CONCLUSION Artificial Intelligence in Africa’s Healthcare: Ethical Considerations ORF ISSUE BRIEF No. 312 | SEPTEMBER 2019 9 with existing protections, such as consumer protection, consumer rights and data protection. 2. Policies must be well informed and align with the needs and values of the cultures represented in each African nation, as well as provide a holistic vision for a better future. Thus, AI regulation overlaps with areas such as data privacy, big tech and data regulation, consumer rights, ethics, social justice and law. The government must work with technology companies, researchers and academia, and civil society groups, putting aside differences in perceptions of ethical standards and social justice. This is the only way to ensure that they arrive at the most effective ways to regulate this sector. 3. AI allows for the creation of solutions in a new way that can mask the underlying logic. Underrepresented and historically marginalised communities are already victimised by existing systems that reinforce their positions in society. Therefore, all stages and elements of AI applications—training data, algorithms, effective performance—must be carefully examined to ensure fairness towards such groups. Governments have struggled to develop cybersecurity and data-privacy norms that foster both security and growth. Today they face the additional challenge of developing norms that also address the ethical use of AI. However,

governments cannot formulate regulations regarding the emerging uses of AI based on vague ethical ideas, since that will not only be ineffective but could also be detrimental to the innovative process. The imperative, therefore, is not policymaking but educating companies about their obligations and the society at large about the potential utility and risks of AI in healthcare. The governments of Africa should focus on “ethics by design” and be forwardlooking in technology implementation and use. These measures can help create effective long-term regulations while also allowing for innovative AI solutions for healthcare in African countries.

11. [Artificial Intelligence \(AI\) usage policy for Microsoft](#)

Using Artificial Intelligence tools on Microsoft Q&A

AI tools garner much attention as they're more accessible to individuals with the quickly growing popularity of ChatGPT.

Many Microsoft Q&A contributors use these tools to help with the questions that are posted.

In May 2023, we launched [Q&A Assist](#) for Microsoft Q&A. Q&A Assist uses AI to help you find similar questions, ask better questions, and get answers from Microsoft Learn documentation.

These tools are focused on assisting question authors, and there isn't an option to use these tools to help answering questions.

This document explains the policy for using AI tools to answer questions on Microsoft Q&A. It also describes how the platform moderators handle violations of these guidelines.

AI usage policy for Microsoft Q&A

Follow these steps when using AI to generate an answer on Q&A:

Mention the AI service name that generated the answer, fully or partly.

Check the AI output accuracy and relevance and adjust it as needed. Indicate you validated or updated the AI output in your answer.

Include any sources AI generated or you used as you validated and updated the AI output.

Using AI to help with answers on Microsoft Q&A requires following these three steps. Otherwise, moderators might delete the content and suspend your account.

Moderator actions for AI-generated content on Microsoft Q&A

If a moderator finds AI-generated content on the platform that violates the requirements, they may take the following steps:

Reply to the content with a comment including information the platform's AI policy.

Delete the content that violates the policy, if the user doesn't respond to the notice or fails to make the necessary changes.

Suspend the user's account, if the user repetitively fails to make the necessary changes.

Use of alternative accounts to circumvent a suspension, would be considered in violation of our [Code of Conduct for Microsoft Q&A](#).

Appeals process for deletions or suspensions due to AI usage on Microsoft Q&A

You can appeal the removal of your content from Q&A or the suspension of your account at this [email address](#).

12. [Apple Restricts Use of ChatGPT](#)

[Apple](#) has restricted use of ChatGPT and other external artificial intelligence tools as it develops its own similar technology, according to a document reviewed by The Wall Street Journal and people familiar with the matter.

Apple is concerned workers who use these types of programs could release confidential data, according to the document. Apple also told its employees not to use [Microsoft](#) -owned GitHub's Copilot, which automates the writing of software code, the document said.

ChatGPT, created by Microsoft-backed OpenAI, is a chatbot derived from a so-called large language model that is able to answer questions, write essays and perform other tasks in humanlike ways.

When people use these models, data is sent back to the developer to enable continued improvements, presenting the potential for an organization to unintentionally share proprietary or confidential information. OpenAI disclosed in March that it took ChatGPT temporarily offline because a bug allowed some users to see the titles from a user's chat history.

An OpenAI spokeswoman pointed to an announcement last month where the company introduced the ability for users to turn off their chat history, which the company said would block the ability to train the AI model on that data.

Apple is known for its rigorous security measures to guard information about future products and consumer data. A number of organizations have also grown wary of the technology as its workers have begun using it for everything from writing emails and marketing material to coding software.

[JPMorgan Chase](#) and [Verizon](#) have [barred use](#). David Banks, the chancellor of New York City's schools, said in an op-ed published on Thursday that it rescinded its ChatGPT ban.

[Amazon.com](#) has urged its engineers who want to use ChatGPT for coding assistance to use [its own internal AI tool](#), a spokeswoman recently told the Journal. Apple is also working on its own large language models, people familiar with the matter said.

Apple's AI efforts are being led by John Giannandrea, whom Apple hired from Google in 2018. Under Mr. Giannandrea, a senior vice president at Apple reporting to Chief Executive Tim Cook,

Apple has acquired a number of artificial intelligence startups.

In Apple's most recent [quarterly earnings call](#) with analysts, Apple Chief Executive Tim Cook expressed some concerns about advancements in this area also known as generative artificial intelligence.

"I do think it's very important to be deliberate and thoughtful in how you approach these things," Mr. Cook said. "And there's a number of issues that need to be sorted as is being talked about in a number of different places, but the potential is certainly very interesting."

Apple has also recently paid close attention to new software coming onto its iPhone App Store that takes advantage of generative artificial intelligence. When app developer Blix tried to update its email app [BlueMail with a ChatGPT feature](#), Apple temporarily blocked the update on grounds that it could potentially show inappropriate content to children.

Apple's review team asked the developer to either move up the app's age restriction to 17 and older—it was set at 4 and older—or include content filtering. Once Blix assured Apple that it already had implemented [content filtering on the ChatGPT feature](#), the app was approved.

On Thursday, OpenAI announced a ChatGPT app for the iPhone and iPad.

Apple was an early entrant into the consumer application of artificial intelligence when it [launched the Siri voice assistant](#) in 2011. But the company fell behind the likes of Amazon's Alexa in subsequent years.

13. [Google AI principles](#)

Our Principles

While we are optimistic about the potential of AI, we recognize that advanced technologies can raise important challenges that must be addressed clearly, thoughtfully, and affirmatively. These AI Principles describe our commitment to developing technology responsibly and work to establish specific application areas we will not pursue.

Objectives for AI applications

1. Be socially beneficial.

The expanded reach of new technologies increasingly touches society as a whole. Advances in AI will have transformative impacts in a wide range of fields, including healthcare, security, energy, transportation, manufacturing, and entertainment. As we consider potential development and uses of AI technologies, we will take into account a broad range of social and economic factors, and will proceed where we believe that the overall likely benefits substantially exceed the foreseeable risks and downsides.

AI also enhances our ability to understand the meaning of content at scale. We will strive to make high-quality and accurate information readily available using AI, while continuing to respect cultural, social, and legal norms in the countries where we operate. And we will continue to thoughtfully evaluate when to make our technologies available on a non-commercial basis.

2. Avoid creating or reinforcing unfair bias.

AI algorithms and datasets can reflect, reinforce, or reduce unfair biases. We recognize that distinguishing fair from unfair biases is not always simple, and differs across cultures and societies. We will seek to avoid unjust impacts on people, particularly those related to sensitive characteristics such as race, ethnicity, gender, nationality, income, sexual orientation, ability, and political or religious belief.

3. Be built and tested for safety.

We will continue to develop and apply strong safety and security practices to avoid unintended results that create risks of harm. We will design our AI systems to be appropriately cautious, and seek to develop them in accordance with best practices in AI safety research. In appropriate cases, we will test AI technologies in constrained environments and monitor their operation after deployment.

4. Be accountable to people.

We will design AI systems that provide appropriate opportunities for feedback, relevant explanations, and appeal. Our AI technologies will be subject to appropriate human direction and control.

5. Incorporate privacy design principles.

We will incorporate our privacy principles in the development and use of our AI technologies. We will give opportunity for notice and consent, encourage architectures with privacy safeguards, and provide appropriate transparency and control over the use of data.

6. Uphold high standards of scientific excellence.

Technological innovation is rooted in the scientific method and a commitment to open inquiry, intellectual rigor, integrity, and collaboration. AI tools have the potential to unlock new realms of scientific research and knowledge in critical domains like biology, chemistry, medicine, and environmental sciences. We aspire to high standards of scientific excellence as we work to progress AI development.

We will work with a range of stakeholders to promote thoughtful leadership in this area, drawing on scientifically rigorous and multidisciplinary approaches. And we will responsibly share AI knowledge by publishing educational materials, best practices, and research that enable more people to develop useful AI applications.

7. Be made available for uses that accord with these principles.

Many technologies have multiple uses. We will work to limit potentially harmful or abusive applications. As we develop and deploy AI technologies, we will evaluate likely uses in light of the following factors:

Primary purpose and use: the primary purpose and likely use of a technology and application, including how closely the solution is related to or adaptable to a harmful use

Nature and uniqueness: whether we are making available technology that is unique or more generally available

Scale: whether the use of this technology will have significant impact

Nature of Google’s involvement: whether we are providing general-purpose tools, integrating tools for customers, or developing custom solutions

AI applications we will not pursue

In addition to the above objectives, we will not design or deploy AI in the following application areas:

1. Technologies that cause or are likely to cause overall harm. Where there is a material risk of harm, we will proceed only where we believe that the benefits substantially outweigh the risks, and will incorporate appropriate safety constraints.
2. Weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people.
3. Technologies that gather or use information for surveillance violating internationally accepted norms.
4. Technologies whose purpose contravenes widely accepted principles of international law and human rights.

As our experience in this space deepens, this list may evolve.

14. Meta Guideline to Responsible AI

Our commitment to Responsible AI

Our Responsible AI efforts are propelled by our mission to help ensure that AI at Meta benefits people and society. Through regular collaboration with subject matter experts, policy stakeholders and people with lived experiences, we’re continuously building and testing approaches to help ensure our machine learning (ML) systems are designed and used responsibly.

Meta’s five pillars of responsible AI that inform our work

We ground our work to ensure that AI is designed and used responsibly around a set of core values.

Privacy and security

Protecting the privacy and security of people’s data is the responsibility of everyone at Meta.

Fairness and inclusion

Everyone should be treated fairly when using our products and they should work equally well for all people.

Robustness and safety

AI systems should meet high performance standards, and should be tested to ensure they behave safely and as intended.

Transparency and control

People who use our products should have more transparency and control around how data about them is collected and used.

Accountability and governance

We build reliable processes to ensure accountability for our AI systems and the decisions they make.

Our progress and learnings in AI fairness and transparency

Datasets

Building diverse datasets and tools for more inclusive AI products

One way we are addressing AI fairness through research is the creation and distribution of more diverse datasets. Datasets that are used to train AI models can reflect biases, which are then passed on to the system. But biases might also be due to what isn't in the training data. A lack of diverse data — or data that represents a wide range of people and experiences — can lead to AI-powered outcomes that reflect problematic stereotypes or fail to work equally well for everyone.

Privacy

Protecting privacy while addressing fairness concerns

Improving fairness will often require measuring the impact of AI systems on different demographic populations and mitigating unfair differences. Yet the data necessary to do so is not always available — and even when it is, collecting it and storing it can raise privacy concerns. After engaging with civil rights advocates and human rights groups that further confirmed the fairness challenges, we identified new approaches to help us access data with the potential to meaningfully measure the fairness of the AI models on our platforms across races.

Ad delivery

Innovating to improve fairness in ad delivery

A critical aspect of fairness is ensuring that people of all backgrounds have equitable access to information about important life opportunities, like jobs, credit, and housing. Our policies already prohibit advertisers from using our ad products to discriminate against individuals or groups of people. However, even with neutral targeting options and model features, factors such as people's interests, their activity on the platform, or competition across all ad auctions for different audiences could affect how ads are distributed to different demographic groups. That's why we've developed a novel use of machine learning technology to help distribute ads in a more equitable way on our apps.

Associations

Generating responsible associations

In 2022, we assembled a cross-disciplinary team, including people from our Civil Rights, Engineering, AI Research, Policy, and Product teams, to better understand problematic content associations in several of our end-to-end systems and to implement technical mitigations to reduce the chance of them occurring on our platforms that use AI models.

As part of this collaborative effort, we carefully constructed and systematically reviewed the knowledge base of interest topics for usage in advanced mitigations that more precisely target the problematic associations. As more research is done in this area and shared with the greater community, we expect to build on this progress and to continue to improve our systems.

AI-driven feeds and recommendations

Giving more control over AI-driven feeds and recommendations

AI-driven feeds and recommendations are a powerful tool for helping people find the people and content they are most interested in, but we want to make sure that people can manage their experience in ways that don't necessarily rely on AI-based ranking.

System cards

Developing new methods for explaining our AI systems

Because AI systems are complex, it is important that we develop documentation that explains how systems work in a way that experts and nonexperts alike can understand.

Policy approaches

Testing new policy approaches to AI transparency, explainability, and governance

The rapid advance of emerging technologies makes it difficult to fully understand and anticipate how they might eventually impact communities around the world.

15. [AWS Responsible AI Policy](#)

Last Updated: September 28, 2023

This AWS Responsible AI Policy (“Policy”) applies to your use of artificial intelligence and machine learning Services, features, and functionality (including third-party models) that we provide (collectively, “AI/ML Services”). This Policy supplements the [AWS Acceptable Use Policy](#) and [AWS Service Terms](#).

Prohibitions. You may not use, or facilitate or allow others to use, the AI/ML Services:

for intentional disinformation or deception;

to violate the privacy rights of others, including unlawful tracking, monitoring, and identification;

to depict a person’s voice or likeness without their consent or other appropriate rights, including unauthorized impersonation and non-consensual sexual imagery;

for harm or abuse of a minor, including grooming and child sexual exploitation;

to harass, harm, or encourage the harm of individuals or specific groups;

to intentionally circumvent safety filters and functionality or prompt models to act in a manner that violates our Policies;

to perform a lethal function in a weapon without human authorization or control.

Responsible AI Requirements. If you use the AI/ML Services to make consequential decisions, you must evaluate the potential risks of your use case and implement appropriate human oversight, testing, and other use case-specific safeguards to mitigate such risks. Consequential decisions include those impacting a person’s fundamental rights, health, or safety (e.g., medical diagnosis, judicial proceedings, access to critical benefits like housing or government benefits, opportunities like education, decisions to hire or terminate employees, or access to lending/credit, and providing legal, financial, or medical advice). You agree to provide information about your intended uses of the AI/ML Services and compliance with this Policy upon request.

You and your end users are responsible for all decisions made, advice given, actions taken, and failures to take action based on your use of AI/ML Services. AI/ML Services use machine learning models that generate predictions based on patterns in data. Output generated by a machine learning model is probabilistic, and generative AI may produce inaccurate or inappropriate content. Outputs should be evaluated for accuracy and appropriateness for your use case.

AWS may investigate and enforce violations of this Policy as noted in the [AWS Acceptable Use Policy](#). AWS is committed to developing safe, fair, and accurate AI and ML services and providing you with tools and guidance to assist you in building and using AI and ML applications responsibly, see our [Responsible Use of AI and ML page](#) for additional tools and resources.

Building AI responsibly at AWS

The rapid growth of generative AI brings promising new innovation, and at the same time raises new challenges. At AWS we are committed to developing AI responsibly, taking a people-centric approach that prioritizes education, science, and our customers, to integrate responsible AI across the end-to-end AI lifecycle.

Core dimensions of responsible AI

Fairness

Considering impacts on different groups of stakeholders

Explainability

Understanding and evaluating system outputs

Privacy and security

Appropriately obtaining, using, and protecting data and models

Safety

Preventing harmful system output and misuse

Controllability

Having mechanisms to monitor and steer AI system behavior

Veracity and robustness

Achieving correct system outputs, even with unexpected or adversarial inputs

Governance

Enabling stakeholders to make informed choices about their engagement with an AI system

Transparency

Incorporating best practices into the AI supply chain, including providers and deployers

16. [Oracle Generative AI strategy](#)

[Artificial intelligence \(AI\)](#) is fundamentally changing the way that we interact with the world. This change presents both opportunities and challenges for organizations that want to take advantage of [new AI technologies](#). Nowhere is this idea truer than with [generative AI](#). Generative AI models combine the ability to assimilate knowledge from many sources and use it to automate tasks and enhance human creativity and productivity. Using this technology, organizations can summarize documents, build tables, create new and meaningful text, generate code, and synthesize ideas.

Many vendors are trying to move quickly in this space, but no one is addressing the specific, end-to-end needs of enterprise customers with generative AI.

Oracle's strategy aims at the enterprise

Oracle's strategy is built around the reality that enterprises work with AI through three different modalities: Infrastructure, [models and services](#), and within applications.

First, we provide a robust infrastructure for training and serving models at scale. Through our partnership with NVIDIA, we can give customers [superclusters](#), which are powered by the latest GPUs in the market connected together with an ultra-low-latency RDMA over converged ethernet (RoCE) network. This solution provides a highly performant, cost-effective method for training generative AI models at scale. Many AI startups like Adept and MosaicML are building their products directly on OCI.

Second, we provide easy-to-use cloud services for developers and scientists to utilize in fully managed implementations. We're enabling new generative AI services and business functions through our partnership with [Cohere](#), a leading generative AI company for enterprise-grade large language models (LLMs). Through our partnership with Cohere, we're building a new generative AI service. This upcoming AI service, OCI Generative AI, enables OCI customers to add generative AI capabilities to their own applications and workflows through simple APIs.

Third, we embed generative models into the applications and workflows that business users use every day. Oracle plans to embed generative AI from Cohere into its Fusion, NetSuite, and our vertical software-as-a-service (SaaS) portfolio to create solutions that provide organizations with the full power of generative AI immediately. Across industries, Oracle can provide native generative AI-based features to help organizations automate key business functions, improve

decision-making, and enhance customer experiences. For example, in healthcare, Oracle Cerner manages billions of electronic health records (EHR). Using anonymized data, Oracle can create generative models adapted to the healthcare domain, such as automatically generating a patient discharge summary or a letter of authorization for medical insurance.

[Oracle's generative AI offerings](#) span applications to infrastructure and provide the highest levels of security, performance, efficiency, and value.

The Oracle difference for generative AI

Many major cloud providers are coming out with generative AI offerings right now. But what makes Oracle best suited for generative AI? Some of the differences are clear, such as an established history of storing the world's most business-critical, valuable data, a [modern data platform](#), and low-cost, high-performance [AI infrastructure](#).

However, more factors demonstrate why Oracle can declare that its generative AI offering is truly built for enterprises with an approach that spans considerations, such as cloud-to-on-premises data, deployment to business apps, security, data privacy, and now the best LLMs for enterprise success.

Powerful and high-performing models

Oracle works to create the best models for your organization using its unique data and industry knowledge. From acquisitions, such as Cerner, and experience through our suite of business apps, Oracle trains specialized models that are unique to verticals and our industry-leading SaaS solutions. But Oracle's approach further enables organizations to refine these prebuilt models using their own data, so the models understand an organization's business like no other.

Unrivaled data security, privacy, and governance

As customers refine and train prebuilt generative AI models with their own data, they can also trust that Oracle continues to fully protect data. Unlike other generative AI offerings, Oracle's generative AI doesn't mix customer data. The models trained by customers are unique to them, and tools for accessing data provenance and lineage are available. Oracle protect data privacy and sovereignty.

Embedded generative AI services

Oracle is integrating and embedding AI across its portfolio of cloud applications, including CRM, ERP, HCM, CX and EMR applications. In addition, Oracle is making generative AI capabilities available in its database portfolio in the same way that it introduced machine learning (ML) features in Oracle Database service and MySQL HeatWave.

Generative AI available wherever customers need it

Customers can use Oracle's upcoming OCI Generative AI service on Oracle Cloud Infrastructure (OCI) and reap all the benefits of public cloud: Pay for what you use, scale on demand, customize models, and create private model endpoints.

Oracle can also deliver the complete AI stack to organizations' data centers with cloud deployment options, such as OCI Dedicated Region, to enable organizations to combine generative AI capabilities together with their on-premises data and applications.

Join the AI revolution

As Oracle Chairman and CTO Larry Ellison highlighted in the Q4 FY23 earnings call, a technology revolution is dawning, one in which AI plays a central role. Oracle envisions a world where AI models can help humans more quickly extract insights from enterprise data, augment human creativity and empower human-centric interfaces to solve real-world problems. Join the revolution with Oracle!

17. [Adobe Generative AI Guidelines](#)

Adobe Generative AI User Guidelines

Last Updated: May 10, 2024

These Generative AI User Guidelines (“Guidelines”) govern your use of Adobe’s generative AI features. In addition, if your agreement with Adobe is governed by the [General Terms of Use](#) located at adobe.com/go/terms, then your use of these generative AI features is also governed by the [Adobe Generative AI Additional Terms](#) located at adobe.com/go/adobe-gen-ai-addl-terms, which are incorporated by reference into these Guidelines.

These Guidelines have two goals: to maintain the high quality of content generated using Adobe’s suite of products and services, and to keep our products and services accessible to our users in an engaging and trustworthy way that fosters creativity and productivity.

1. No AI/ML Training

When using our generative AI features, you agree you will use them only for your creative and productivity work product and not to train artificial intelligence or machine learning models.

This means you must not, and must not allow third parties to, use any content, data, output or other information received or derived from any generative AI features, including any Firefly outputs, to directly or indirectly create, train, test, or otherwise improve any machine learning algorithms or artificial intelligence systems, including any architectures, models, or weights.

2. Be Respectful and Safe

Do not use Adobe’s generative AI features to attempt to create, upload, or share abusive, or illegal, or content that violates the rights of others. This includes, but is not limited to, the following:

Pornographic material or explicit nudity

Hateful or highly offensive content that attacks or dehumanizes a group based on race, ethnicity, national origin, religion, serious disease or disability, gender, age, or sexual orientation

Graphic violence or gore

The promotion, glorification, or threats of violence

Illegal activities or goods

Self-harm or the promotion of self-harm

Depictions of nude minors or minors in a sexual manner

Promotion of terrorism or violent extremism

Dissemination of misleading, fraudulent, or deceptive content that could lead to real-world harm

Private information of others

Your prompts and the results generated by generative AI features in Creative Cloud products may be reviewed through both automated (e.g., machine learning) and manual methods for abuse prevention and content filtering purposes.

Please note that we may report any material exploiting minors to the National Center of Missing & Exploited Children (NCMEC).

If at any time you believe someone has violated these Guidelines, please report it by contacting us at abuse@adobe.com.

3. Be Authentic

We disable accounts that engage in behavior that is deceptive or harmful, including:

Using fake, misleading, or inaccurate information in your profile

Impersonating other people or entities

Using unauthorized automated or scripting processes (such as bulk or automated uploading of content through a script)

Engaging in schemes or third-party services to boost account engagement (artificially increasing the number of appreciations, views, or other metrics)

4. Be Respectful of Third-Party Rights

Using Adobe’s generative AI features to create, upload, or share content that violates third-party copyright, trademark, privacy, publicity, or other rights is prohibited. This may include, but is not limited to, entering text prompts designed to generate copyrighted, trademarked, or otherwise infringing content, uploading an input or reference image that includes a third party’s copyrighted content, generating text that plagiarizes third-party content, or using a third party’s personal information in violation of their privacy or data protection rights. If you’re not sure whether your content violates the rights of a third party, you may want to reach out to an attorney or consult publicly available reference materials at the following:

[U.S. Copyright Office](#)

[U.S. Patent & Trademark Office](#)

[Lumen](#)

If you want to report the misuse of your own creative work or your own intellectual property by one of our users, you can do that here: [Intellectual Property Removal Policy](#) located at <https://www.adobe.com/legal/dmca.html>. If you have a contract or other dispute with an Adobe user regarding content they have uploaded to our products and services, please resolve the issue directly with the user. We can’t moderate contract, employment, or other disputes between our users and the public.

5. Use Your Judgment

Generated outputs sometimes may be inaccurate or misleading, or otherwise reflect content that does not represent Adobe’s views. As a result, please use your judgment to review and validate generated outputs.

6. No Professional Advice

Generative AI features are not intended for professional advice. Do not use generative AI features to seek or provide legal, medical, financial, or other kinds of professional advice or any opinions, judgments, or recommendations without conducting your own independent consultation or research. Generative AI features cannot replace advice provided by a qualified professional and do not form any such relationship (e.g., attorney-client relationship).

7. Content Credentials

Adobe may attach or publish Content Credentials for content created with generative AI features to let people know it was generated with AI. [Learn more about Content Credentials.](#)

8. Commercial Use

In general, you may use outputs from generative AI features commercially. However, if Adobe designates in the product or elsewhere that a beta version of a generative AI feature cannot be used commercially, then the generated outputs from that beta feature are for personal use only and cannot be used commercially.

9. Additional Content Sources

The output from our generative AI features may include non-generative content (such as Adobe Stock assets) that is subject to the terms of your agreement with Adobe. This non-generative content will be noted in the user interface or related documentation.

10. More Information

We may take action on your Adobe account if we discover content or behavior that violates these Guidelines. For more information about what you can and can't do while using Adobe's generative AI features, please refer to your agreement with Adobe.

18. [Qualcomm AI strategy](#)

AI is transforming everything. We are making AI ubiquitous.

Today, more intelligence is moving to end devices, and mobile is becoming the pervasive AI platform. Building on the smartphone foundation and the scale of mobile, Qualcomm envisions making AI ubiquitous—expanding beyond mobile and powering other end devices, machines, vehicles, and things. We are inventing, developing, and commercializing [power-efficient on-device AI](#), edge cloud AI, and 5G to make this a reality.

Creating new intuitive experiences and interactions.

AI enables devices and things to perceive, reason, and act intuitively. Drawing inspiration from the human brain, AI will expand our human abilities by serving as a natural extension of our senses. It will also personalize our experiences through seamless interactions in our everyday life.

Reshaping industries and creating new possibilities.

Goldman Sachs predicts that generative AI could raise global GDP by almost \$7 trillion over a 10-year period. Hybrid AI, which distributes processing between the device and cloud, is a key part of achieving this growth across the global economy. On-device AI processing offers many benefits, including user privacy, security, immediacy, enhanced reliability, and cost. The pace, scale, and high integration that drive the mobile industry is allowing AI to scale to billions of devices. The power-efficient AI technology that we research and develop is fundamental across industries and products, spanning from smartphones, PCs, and XR to IoT and automotive.

The future of AI is hybrid.

As generative AI adoption grows at record-setting speeds and drives higher demand for compute, AI processing must be distributed between the cloud and devices for AI to scale and reach its full potential. Beyond cost, a hybrid AI architecture offers the additional benefits of performance, personalization, privacy, and security. The cloud and edge devices work together to deliver more powerful, efficient, and highly optimized AI. The hybrid AI approach is applicable to virtually all generative AI applications and device segments – including phones, laptops, XR headsets, cars, and IoT.

We are making hybrid AI a reality.

Qualcomm is enabling intelligent computing everywhere. As the on-device AI leader, Qualcomm Technologies is uniquely positioned to scale hybrid AI with industry-leading hardware and software solutions across billions of edge devices. Our hardware offers industry-leading performance per watt, and our perpetual flywheel of innovation keeps us at the forefront of on-device AI solutions. With our technology leadership, global scale, and ecosystem enablement, Qualcomm Technologies is making hybrid AI a reality.

We are the R&D engine fueling the AI industry.

With over a decade of AI research and development, we are creating the essential components to scale AI across industries. To make AI ubiquitous, we are focused on efficient hardware, algorithmic advancements, and software tools. Our research is diverse, and we are keenly focused on power efficiency and personalization to make AI seamless across our everyday experiences.

AI and 5G will power the era of distributed intelligence.

Our technology inventions are not only driving power efficient AI, but are also leading the world to 5G—the foundation for an intelligently connected future. The combination of these two technology platforms, led by Qualcomm, will scale intelligence to trillions of connected things.

AI is here today.

With our industry-leading technology in 5G and low-power heterogeneous computing, we are well positioned to lead the AI revolution. We've introduced a broad portfolio of products across a variety of industries to make AI ubiquitous. From efficient AI hardware and software to comprehensive software development kits, we are collaborating with the industry to bring exciting new experiences to the world.

Qualcomm Vision Intelligence Platform

The Qualcomm® Vision Intelligence Platform brings powerful visual computing and edge computing for machine learning to a variety of IoT devices.

AI Development Tools

Discover our AI software development kits, documentation, forum, and other resources to kickstart your projects from the Qualcomm Developer Network.

[Learn more about our AI resources](#)

AI Open Source Projects

Qualcomm Innovation Center open sourced the AI Model Efficiency Toolkit (AIMET), which includes state-of-the-art quantization and compression techniques.

Power efficiency

Power efficiency is essential for AI. We research deep learning techniques for power-efficient implementations across hardware, algorithms, and software.

[Download presentation](#)

Personalization

Personalization is essential for superior user experiences. We research continuous learning techniques that allow adaption to user behavior and preferences.

AI is here today.

With our industry-leading technology in 5G and low-power heterogeneous computing, we are well positioned to lead the AI revolution. We've introduced a broad portfolio of products across a variety of industries to make AI ubiquitous. From efficient AI hardware and software to comprehensive software development kits, we are collaborating with the industry to bring exciting new experiences to the world.

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[Learn more about open sourcing AIMET](#)

19. [Generative AI: 5 Guidelines for Responsible Development](#)

Editor’s Note: AI Cloud, Einstein GPT, and other cloud GPT products are now Einstein. For the latest on Salesforce Einstein, go [here](#).

Generative artificial intelligence (AI) has the power to transform the way we live and work in profound ways and will challenge even the most innovative companies for years to come.

But generative AI is not without risks. [It gets a lot of things right but many things wrong](#). As businesses race to bring this technology to market, it’s critical that we do so inclusively and intentionally. It’s not enough to deliver the technological capabilities of generative AI, we must prioritize responsible innovation to help guide how this transformative technology can and should be used — and ensure that our employees, partners, and customers have the tools they need to develop and use these technologies safely, accurately, and ethically.

Generative AI at Salesforce

The potential for generative AI at Salesforce — and enterprise technology more broadly — is vast.

AI is already an integral part of [Einstein 1](#), and our [Einstein AI](#) technologies deliver nearly 200 billion predictions every day across Salesforce’s business applications, including:

Sales, which [uses AI insights](#) to identify the best next steps and close deals faster.

Service, [which uses AI to](#) have human-like conversations and provide answers to repetitive questions and tasks, freeing up agents to handle more complicated requests.

Marketing, [which leverages AI](#) to understand customer behavior and personalize the timing, targeting, and content of marketing activities.

Commerce, [which uses AI](#) to power highly personalized shopping experiences and smarter ecommerce.

Now, generative AI has the potential to help our customers connect with their audiences in new, more personalized ways across many sales, customer service, marketing, commerce, and IT interactions. We're even exploring the use of AI-generated code to help our customers – even those without certified Salesforce developers on staff – write high-quality code faster, using fewer lines of code and therefore, requiring less CPU.

Building Generative AI We Can Trust

[INSIGHTS FROM SALESFORCE'S CHIEF SCIENTIST](#)

Guidelines for Trusted Generative AI

Like all of our innovations, we are embedding ethical guardrails and guidance across our products to help customers innovate responsibly — and catch potential problems before they happen.

Given the tremendous opportunities and challenges emerging in this space, we're building on our [Trusted AI Principles](#) with a new set of guidelines focused on the responsible development and implementation of generative AI.

We are still in the early days of this transformative technology, and these guidelines are very much a work in progress — but we're committed to learning and iterating in partnership with others to find solutions.

Below are five guidelines we're using to guide the development of trusted generative AI, here at Salesforce and beyond.

Accuracy: We need to deliver verifiable results that balance accuracy, precision, and recall in the models by enabling customers to train models on their own data. We should communicate when there is uncertainty about the veracity of the AI's response and enable users to validate these responses. This can be done by [citing sources](#), explainability of why the AI gave the responses it did (e.g., [chain-of-thought prompts](#)), highlighting areas to double-check (e.g., statistics, recommendations, dates), and creating guardrails that prevent some tasks from being fully automated (e.g., launch code into a production environment without a human review).

Safety: As with all of our AI models, we should make every effort to mitigate bias, toxicity, and harmful output by conducting bias, explainability, and robustness assessments, and red teaming. We must also protect the privacy of any personally identifying information (PII) present in the data used for training and create guardrails to prevent additional harm (e.g., force publishing code to a sandbox rather than automatically pushing to production).

Honesty: When collecting data to train and evaluate our models, we need to respect data provenance and ensure that we have consent to use data (e.g., open-source, user-provided). We must also be transparent that an AI has created content when it is autonomously delivered (e.g., chatbot response to a consumer, [use of watermarks](#)).

Empowerment: There are some cases where it is best to fully automate processes but there are other cases where AI should play a supporting role to the human — or where human judgment is

required. We need to identify the appropriate balance to “supercharge” human capabilities and make these solutions accessible to all (e.g., generate ALT text to accompany images).

Sustainability: As we strive to create more accurate models, we should develop right-sized models where possible to reduce our carbon footprint. When it comes to AI models, larger doesn’t always mean better: In some instances, smaller, better-trained models outperform larger, more sparsely trained models.

20. [CGI optimizing generative AI potential](#)

The rush to bring the benefits of AI and generative AI to federal technology applications has dominated the mainstream media. Solution and services providers to the federal government are racing to position and expand with new AI capabilities, which brings new challenges.

Unlike many other commercial solutions, CGI’s Momentum ® is specifically designed around the nuances of federal regulations and a leading choice for today’s federal agencies for budgeting, financial management, acquisitions, and asset management (as provided by CGI’s Sunflower solution).

At CGI, our approach with generative AI for our Momentum and Sunflower solutions focuses on three principles of [choice, support, and security](#). For this first blog in a series, I will discuss the aspects of what “choice” means with our Momentum and Sunflower solutions.

An agnostic approach enables agencies to choose with freedom from lock-in

Every agency is unique with different missions, environment, technology. While entering into the AI realm for efficiencies is exciting, agencies need to proceed with caution as new capabilities bring new risks and vulnerabilities. The White House continues to provide guidance on this topic with its latest [executive order](#).

At CGI, we understand that balancing business and mission priorities is a delicate process and federal agencies need a solution that is flexible to keep up changes in mandates, policies, and the technology landscape. Our approach to generative AI brings all the benefits to federal agencies, but with the highest levels of flexibility and choice. We’ve embedded application programming interfaces (APIs) and accelerator packages into our Momentum® and Sunflower™ solutions, enabling customers to leverage generative AI capabilities with their own data, using their own data models or models we’ve provided in the systems. In other words, the customer controls the data set and AI interface.

Our AI vision and Momentum ® and Sunflower ™ solutions roadmaps are aligned with the principles of remaining agnostic as well as bring-your-own-consumption model (not CGI-owned). As a systems integrator, our approach to AI is much broader with the ability to connect to any model, cloud, or tool and our federal clients have ultimate flexibility to seamlessly add new AI capabilities into their existing applications. This approach allows agencies to gain new capabilities and leverage competitive pricing models, without being locked into a specific approach, engine, or tool.

Choose an AI journey unique to your agency

The power of generative AI comes from learning using large sets of data; as a system ingests and analyzes vast amounts of data and information, it gains a wide array of choices it will later use when generating its own text. As our generative AI and accelerator packages are cloud and tool agnostic, using the right APIs enables the AI functions in any IT environment.

However, it is important to train the AI on data that is directly relevant to the system's intended use. This is where Momentum and Sunflower clients can experiment and refine their approach, allowing the system to provide specific agency data and therefore training the system directly on the agency's information parameters for expected outcomes and processes. This reduces the likelihood of "hallucinations" that can occur when generative AI models presents incorrect responses based on the highest-probability data or bias in large data sets. Our accelerator packages, which are prepackaged solutions that work against Momentum and Sunflower data, reduce the hurdles of adoption, whereby agencies can access generative AI benefits against the Momentum datasets with proven AI solutions.

Intentional use of algorithms to yield expected outcomes

Before deploying any application, agencies need to show how the algorithms produce specific output. That proof point could also become a point of improper disclosure.

Therefore, we urge agencies to be cautious about claims that combining multiple agencies' data into a single training set is the way to go. To the contrary, agencies want to train algorithms only with the data sufficient to get your required outcomes.

Agencies must, in their AI programs, build in compliance with statutes and executive orders connected to Health Insurance Portability and Accountability Act (HIPAA) information and any type of PII and controlled but unclassified information (CUI). They should add any agency-specific prohibitions on information they are allowed to share or aggregate.

To be sure, thanks to our work at multiple agencies, CGI has developed big data sets. For instance, in our Momentum application, we handle data covering a significant percentage of federal spending. But we also pay strict attention to how users can easily query the data they need and retrieve only the appropriate data for the result they want—and are authorized to access.

We understand that each agency has its own PII and otherwise sensitive data. That is why we use controlled, measured approaches to each client's application. Our aim is to enable agencies to create AI applications that make them more productive and efficient, without introducing undue cybersecurity or disclosure risk. We recognize that an agency's data sets belong to the agency and are not to be shared where such sharing is prohibited.

AI has become more powerful and versatile than it once was, and federal agencies appear to be ready to experiment and try AI applications. Agencies that are careful, thoughtful and judicious in how they apply AI stand to reap the rewards.

Finding the right use cases

As much as any other technology, AI excels in some use cases, and is not helpful at all in others. Agencies should analyze possible implementations to determine where AI would produce quick, easy and significant results. Specific implementations and use cases allow low-consequence experiments. CGI's federal experts are well-versed in helping clients define and implement use cases to understand benefits and optimize outcomes.

Some use cases that agencies can explore include:

Predictive analytics—Many agencies respond to challenges reactively. With AI, you get ahead of events. The system sends warning signs, so you act proactively and minimize problems.

Automate and streamline contract closeouts or other processes: With contract closeouts, the system recognizes when a device reaches its end of life or when the expenditure has hit its ceiling and automatically closes out the contracts rather than have an employee manually take those steps.

Trend analysis: AI systems collect, consolidate, correlate, and deliver new insights. Agencies identify how their internal organizations have been operating and can see how to make them better and more effective.

Natural language processing (NLP): Incorporating natural language processing into customer interactions provides self-service, reduces processing time and lowers errors, all of which improve the citizen experience.

A vision for the future

CGI is your partner to understand, develop, and implement generative AI within your agency to meet your goals. Our experts can provide guidance and insight into proven strategies from technology to implementation. Whether you're seeking to optimize Momentum or Sunflower or create unique use cases to inform your agency vision, CGI is your proven partner.

For more information about CGI's AI capabilities in the federal marketplace, [visit our website](#).

For more information on Momentum and Sunflower, visit www.cgi.com/Momentum and www.cgi.com/Sunflower.

21. [LG Presents 'AI Ethics Principles' for Trustworthy AI Research](#)

LG Presents 'AI Ethics Principles' for Trustworthy AI Research

LG presented its "AI Ethics Principles" that serve as the basis for right action and value judgment of all LG employees who research and use AI. It is a significant step forward in the development of ESG management.

The principles were carefully selected based on LG's management principles of "Creating Values for Customers" and "People-oriented Management" as well as core values for developing trustworthy AI. LG plans to establish a concrete implementation plan so that its AI Ethics Principles do not violate or regulate the autonomy of research and is further employed to develop ethical AI which adds more value to customers' life beyond technology.

LG's AI Ethics Principles consist of 5 core values: Humanity, Fairness, Safety, Accountability, and Transparency. Each of them is further described below:

- Humanity
 - LG AI provides benefits to humanity and society.
 - LG AI does not violate human rights.

- Fairness
 - LG AI treats all people fairly while respecting diversity.
 - LG AI avoids unfair discrimination based on individual characteristics.

- Safety
 - LG AI operates in a safe and robust manner.
 - LG AI predicts and responds to potential risks.

- Accountability
 - LG AI clearly defines roles and responsibilities for those involved in development and use.
 - LG AI strives to fulfil the responsibility to operate appropriately in line with the intention of the human.

- Transparency
 - LG AI is transparent with our customers to help them better understand and trust how AI works.
 - LG AI follows principles and standards to ensure transparency in our algorithms and data.

As the hub of AI research for the entirety of LG Group, LG AI Research newly established “AI Ethical Inspection TF (Task Force)” in order to properly publicize the importance of the AI Ethics Principles and to review and implement measures to practically apply them in various tasks. The AI Ethical Inspection TF aims to train all the members of LG on the AI Ethics Principles, thereby allowing them to contemplate on AI technology and its social responsibility. The TF is also in charge of examining ethical problems that may occur in the course of AI research and development.

With regard to the presentation of the principles, the Chief of LG AI Research Kyunghoon Bae commented, “The valuation of AI will vary depending on how people regard and use AI. Through ‘LG AI Ethics Principles’ LG will continue our research on the coexistence of human and AI and create genuine customer values.”

By the end of this year, LG AI Research plans to create an “AI Ethics Working Group” in collaboration with 10 LG subsidiaries to discuss major AI ethics issues. AI Ethics Working Group will be comprised of members from LG Electronics, LG Display, LG Innotek, LG Chem, LG Energy Solution, LG Household & Health Care, LG Uplus, LG HelloVision, and LG CNS. The data and case studies accumulated by AI Ethical Inspection TF and AI Ethics Working Group will be utilized to create ethical guidelines for each and every field of AI that LG is currently involved by the year 2023.

Since its foundation at the end of 2020, LG AI Research has spared no efforts in researching trustworthy and ethical AI technologies for its customers. One of the most notable technologies is the “hate speech detection” technology designed to help customers avoid hateful and

discriminatory statements when using customer service chatbots or other AI services. Started as the idea to resolve the issue of malicious comments which are the root cause of various social conflicts, it is currently under development to not only analyze the words but also the context of each sentence to filter out aggressive and biased information.

“Explainable AI (XAI)” is another ethical AI technology developed by LG AI Research. XAI is an AI technology that can help humans to understand how and why an AI arrived at a specific decision and what, if any, caused an error in the process. For example, during a vision inspection in an automated manufacturing process, the AI not only analyzes an image and determines whether a product is defective or not, but also explains to the operator why the product is determined to be defective. Therefore, it is a technology that is essential in developing expert AI that helps humans make decisions in fields of expertise that require trustworthiness and transparency, such as medicine, law and finance.

In order to develop an ethical AI that is trustworthy, transparent and accountable, LG AI Research is advancing XAI technologies and at the same time, collaborating with multiple LG affiliates to explore ways to utilize them in our daily lives. Utilizing XAI technology, LG AI Research is building a demand forecasting model in collaboration with LG Electronics and LG Household & Health Care, and developing a predictive model for customized immune chemotherapy treatment in collaboration with LG Chem. Furthermore, LG AI Research is working closely with Seoul National University Graduate School of AI and the University of Michigan on technologies associated with AI ethics to develop safer and more ethical AI technologies. LG AI Research will continue to exert our utmost efforts to present high-performance, trustworthy, and safe AI for customers.

[22. Fujitsu Generative AI use guidelines](#)

Fujitsu Generative AI Guidelines January, 2024 ver1.1 © 2024 Fujitsu Limited Introduction To stakeholders who read this document This guideline for the use of Generative AI has been prepared by the Fujitsu Group for our employees. It explains the general risks of Generative AI and examples of countermeasures especially from an ethical and legal perspective. Our company employees take appropriate risk mitigation measures in accordance with this guideline and provide safe and secure Generative AI services to society. The Fujitsu Group has decided to make this guideline available not only to our company employees but also to stakeholders to help society in understanding how to use Generative AI. We hope it will be useful for you. Generative AI Overview © 2024 Fujitsu Limited "Generative AI" refers to a type of AI that generates human-like natural outputs which hardly seem to be auto-generated, in response to simple prompts such as words and sentences. Its generating capacity has already reached a indistinguishable level from that of human intellectual activity. Anyone can generate content quickly and easily without the experience, expertise, or technology Generative AI Use Cases Generative AI is capable of generating a variety of content such as text, program code, image and video, music. For example, it can be used in a wide range of tasks that require intellectual creation, such as: Text Program code Image and video Music Rule-based simple task Grammar check and proofreading Debugging Noise Removal, High Resolution Trimming, Loop Creation Improvement in quality Summaries, Translations Program structure improvement Avoid Errors/Bugs Monochrome → Color Image

generation Illustration - Photo/Movie generation Arrangement of an existing song Assistance for content creation Writing idea proposal Module code generation Photo and video generation from text Melody and rhythm generation Content generation Thesis and story generation App Design Document generation Proprietary app generation Photobook generation Comic book generation Creating original music styles and genres Reference: How does ChatGPT work? As of fiscal year 2023, ChatGPT is the leading text generation AI tool. Its overwhelmingly huge amount of knowledge (more than several hundreds of GB of training data and hundreds of billions of parameters) offers a significantly broader range of expression. ChatGPT predicts the word most likely to follow the previous word, based on the past training data and other sources. It generates text by repeating this prediction process. It is important note that ChatGPT just predicts and generates the most probable combination of words. It does not verify the factual accuracy of its output.

Risks Brought by Generative AI Generative AI is a very useful tool, but it involves legal and ethical risks such as copyright infringement and information leaks. However, these risks are not unique that suddenly arose with the introduction of Generative AI; they have existed in conventional AI as well. Risks and countermeasures are summarized mainly from the viewpoint of Generative AI users, assumed use within the scope of Japanese law.

1. Accuracy The training data for Generative AI often includes a massive amount of web content that has not yet determined to be correct or false. In some cases, Generative AI are trained only on outdated data. Also, as mentioned on page 7, Text Generation AI such as ChatGPT generates text by repeating "predicting probabilities," during the generation process, it does not verify the factual accuracy of its output. As a result, errors due to lack of "accuracy" can appear in the product. If you rely too much on AI to automatically generate text and code, you might be under the illusion that you'll always only get accurate outputs by AI. Offering its outputs without human's judgment of accuracy or adequate checks can lead to lose the trust of customers and society. In some cases, you may be held responsible for damage.
2. Fairness Generative AI can produce unfair results, mainly due to biases and prejudices which inherent in the data and algorithms it learns. 2 Points to note When using outputs of Generative AI, make sure there are no biases or prejudices involved. Use equity-conscious AI tools and services. As you can see above, you may face racial and gender biases. Some Generative AI is trying to improve biases, but we still need to be careful about outputs that eliminate diversity.
3. Copyright infringement Generative AI generates new contents by learning other people's copyrighted materials on the Internet, such as text and images. As a result, its outputs may infringe the copyright of a third party. On considering the relationship between Generative AI and copyrights, it is desirable to separate the "development and learning stages" and "generation and usage stages" because the point to discuss differs in these stages. This document deals with the risks in the "generation and usage stages." In the stages of using Generative AI, outputs may be considered to violate a copyright under Japan's Copyright Act if it meets the following two requirements. Similarity Reliance The output of is "identical" or "similar" to an existing copyrighted work. The output is generated based on an existing copyrighted work. There is not yet a definite social consensus on whether the results produced by Generative AI can be thought to "rely" on its training data. Given this lack of consensus on the "reliance," it is important to take every precaution to avoid the risk of "similarity." * Even if these two requirements are met, the output may be considered not to infringe a copyright in some cases (when the user has obtained permission from the copyright owner, when the term of copyright protection has expired, etc.). Avoid using prompts that involve copyrighted works whose reproduction or modification is prohibited. Make sure that the generated output is not similar to any existing copyrighted works.
4. Information management Some Generative AI systems use the information inputted by users as

AI training data or reusing in their outputs. Therefore, if you input confidential information or personal information to Generative AI, that information may be leaked to the provider of the AI system or other users. Do not input confidential information. Internal information Do not input confidential information into a Generative AI system unless you have a non-disclosure agreement with the provider or some other appropriate measures managing secrecy in place regarding prompts and output results. Review the terms of the contract with the customer who has disclosed the information. If the input of the information is not permitted, get consent from the customer. The rule for the input of personal information is also the same as the rule for the input of customer information. In addition, you need to comply with the laws regarding personal information in the country or region concerned. If you have any questions, contact the Legal Division or Information Management Division for advice. Customer Information Personal Information Opt out of being learned these information if possible. Reference: Leakage of confidential information Some Generative AI systems offer an opt-out option that allows users to block input from being used in training data. However, opt-out does not necessarily mean that your input information will not be used for training and be leaked. In addition to opting out, Fujitsu mandates the use of Generative AI services from companies with confidentiality obligations, in accordance with our security policy. When the provider is only required not to use input information for training to used for learning When the provider is required not to use input information for training as well as to keep information secret (not to leak information) 5. Misuse The use of Generative AI may make it easier than before for people with malicious intent to create malware and other tools for stealing personal information, as well as to commit fraud and other criminal acts. Check whether the information is reliable or figure out the intention of the person who has provided that information. nform customers fully about the uses and risks of Generative AI tools. Summary: Using Generative AI in Fujitsu © 2024 Fujitsu Limited The risks of AI (including Generative AI) presented in the overview and individual cases in this course are typical ones. The course does not cover all the potential ethical and legal risks. Responses to risks may change depending on factors such as the purpose of use, the laws and regulations of each country, region, or industry where AI is used, and social conditions. Please make sure to check the contract conditions and terms of use when you use Generative AI. Fujitsu actively promotes the use of Generative AI while taking appropriate risk mitigation measures such as elearning and an ethical review process. Let's collaborate to realize a society where everyone can enjoy the value brought by AI. For people considering business use of Generative AI ●Fujitsu Kozuchi ●Fujitsu Research Portal Fujitsu AI Ethics and Governance Generative AI Consulting (with Ridgelinez Ltd.) For a secure and trustworthy AI society Giving users opportunities to quickly test Fujitsu's advanced technologies by providing APIs and web applications of tech components for free. Fujitsu Kozuchi is a set of secure, reliable, cloud-based AI services that enhance the productivity and creativity of your business. <https://www.fujitsu.com/jp/about/research/technology/ai/aiethics/index.html> <https://www.ridgelinez.com/service/generative-ai.php> (Japanese) <https://www.fujitsu.com/global/services/kozuchi/> <https://en-portal.research.global.fujitsu.com/> ●Cloud base chat application that anyone can easily use ●Easily incorporated into existing or developing systems that can improve your business efficiencies drastically ●Equipped with “hallucination(*)” detection technology: (*) produce wrong outcomes while using generative AI ●Continuous enhancement 【Feature】 <https://www.fujitsu.com/global/services/kozuchi/> Reference Considerations for AI Code Generator AI code generator is a powerful tool which improves developers' work efficiency and should be used appropriately. However, there are some points to be considered when using AI code generators due to the characteristics of AI. This chapter

summarizes points to keep in mind when using AI Code Generator. Considerations for AI Code Generator Verify the accuracy and functionality of generated codes by human review. Even if the code seems to work well without any error, the generated codes may not be suitable for the intended purpose or may include unexpected and unexplainable logic. Even in the case where the purpose is achieved, the code may not be appropriate from a security point of view. Accuracy Reference Compare with the original specifications. © 2024 Fujitsu Limited Conduct appropriate reviews and tests. Considerations for AI Code Generator When you use AI code generator, the generated code may be similar to the existing third parties' codes because the AI model which has learned the existing source codes generates the output. In particular, the AI model may insert code that it has been trained on into the Copyright generated code it produces, resulting in a license violation. infringement Reference © 2024 Fujitsu Limited Confirm the contamination of existing codes including OSS. Consider using analysis tools that allow you to identify code contamination in existing OSS. Considerations for AI Code Generator Confirm the configuration or contracts to prevent AI from learning user's inputs. Information management Reference © 2024 Fujitsu Limited Our inputs, including codes, are typically sent to the AI code generator's server to suggest new code. Please confirm that the codes we input are kept confidential. In particular if personal data or authentication data is included in the code we input, there is significant risk if it will not be kept confidential. Please take an appropriate measure to avoid inputting raw data. In general, it is better not to include such raw data in source codes. Avoid inputting confidential information or replace it with dummy data. Comments containing sensitive information or a key to use an API functionality

[23. Panasonic Responsible AI use](#)

RESPONSIBLE AI

The Panasonic Group's Efforts to Ensure Responsible AI-Utilizing Operations

Panasonic Group, one of many corporations operating in this changing world, has a primary purpose: to be a customer-friendly corporation and a business that always makes customers' wellbeing.

The Panasonic Group has a grand vision of its AI technologies making customers wellbeing and contributing to sustainable social development. To make this vision a reality, the Group has formulated AI Ethics Principles to serve as an ethical guideline for the use and application of AI technologies. We hereby make these principles open to the public.

Panasonic Group AI Ethics Principles

Panasonic Holdings Corporation announced the establishment of its Panasonic Group AI Ethics Principles which must be observed during the development, implementation, and utilization of AI.

The Group aims to realize customers' well-being and social sustainability utilizing AI. In order to provide innovative products and services as solutions in various business fields, including consumer electronics, housing, automobiles, and B2B solutions, the Group has been focusing considerable efforts on the studying, development, and implementation of AI.

In recent years, ethical issues relating to AI have become social issues due to the inappropriate use of AI, which has caused the promotion of discrimination, infringement of privacy, safety concerns, and more. To deal with these problems, the Organization for Economic Cooperation and Development (OECD) has adopted international policy guidelines. In Japan, the Cabinet Office has issued Social Principles for Human-Centric AI, and the Ministry of Economy, Trade and Industry has issued Governance Guidelines for the Implementation of AI Principles.

In light of these social trends, the Panasonic Group has established AI Ethical Principles that must be observed throughout the entire Group to facilitate the responsible use of AI in order to offer customers reliable AI products and services.

To implement these AI Ethics Principles throughout the Panasonic Group, an AI Ethics Committee has established to conduct AI ethics risk checks at development sites and promote AI ethics training for all Group employees.

Panasonic Group AI Ethics Principles

The Panasonic Group's main goal is to realize an ideal society with affluence both in mind and matter. Incorporating AI into the Group's major businesses—such as consumer electronics, housing, automobiles, and B2B solutions—allows us to offer customers innovative products and services as solutions to their life issues. This is what we are doing in our daily operations in order to create a better way of life and society. AI, when properly applied, can greatly benefit individuals, society, and the environment. Nevertheless, improper application of AI could have grave consequences and disadvantages. To be a customer-friendly corporation and a business that always puts our customers' well-being first, we have established the following AI Ethics Principles.

1. Creating a better life and society

With an awareness of the effects that AI products and services have on our customers, society, and the environment, we deliver AI products and services to customers only when convinced that they stand to offer them a better life while also improving society and the environment. Even after delivering our AI products and services, we will continue to evaluate the way that they affect our customers' lives, society, and the environment, and put to good use what we discover in our products and services.

2. Design, development, and verification for safety

Our top priority is to provide safe AI products and services. To ensure this, we are developing new technologies and building a store of technical knowledge, which we actively employ in our designs. Even after providing customers with our products and services, we take the necessary actions to ensure their safety.

3. Respecting human rights and fairness

When providing our AI products and services, we respect people's diversity and exercise caution to make sure that no unfairness or discrimination arises from their use. To ensure reliable implementation, we provide all of our Group employees with the necessary training and education.

4. Transparency and accountability

Keeping our customers and clients fully informed about our AI operations is important to us. Our AI development and design processes are carried out based on this principle of transparency. We

also respond to all customer inquiries about the effects that AI products and services might have, and are ready to provide the information that customers need.

5. Protecting customers' privacy

We respect customers' privacy by managing customers' information properly and safely in accordance with related laws and Panasonic's internal regulations.

The AI Ethics Principles described herein will be revised in the future to keep pace with the development of AI and social changes.

First version issued on August 29, 2022

Related article : Panasonic Newsoom Global Press Release
Panasonic Group Releases Ethics Principles for AI (August 29, 2022)
<https://news.panasonic.com/global/press/en220829-2>

Systems and Actions to Promote Responsible AI-Utilizing Operations

Panasonic Group AI Ethics Committee

The Panasonic Group AI Ethics Committee has been set up as the organization responsible for supervising/supporting Operating Companies and making sure that they develop and run AI products (AI equipment and services) and use AI technologies in compliance with the AI Ethics Principles. Discussions on establishing the Committee started in 2019, and it was inaugurated in April 2022, the month in which Panasonic Corporation was reborn as Panasonic Holdings Corporation.

The Panasonic Group AI Ethics Committee (hereinafter “AI Ethics Committee”) has been set up as an organization within Panasonic Holdings Corporation, and is made up of personnel in charge of AI ethics and staff who have expertise in Legal Affairs, Intellectual Property, Quality Control, etc. brought in from each Operating Company.

Roles of the AI Ethics Committee

- Set, implement, and promote AI Ethics Principles.
- Promote assessment of risks related to AI ethics, and provide support tools and systems for assessments.
- Carry out training of Group employees in AI ethics.

Examining risks related to AI ethics at AI development sites

The Panasonic Group has a wide range of business fields in which AI technologies are utilized. To make efficient assessments of the risks related to AI ethics that arise in these business fields, risk checks are made by staff at AI product development sites and by the AI Ethics Committee at various stages of the process. These shared responsibilities and roles accelerate innovative AI-utilized business operations.

The AI Ethics Committee has developed an AI ethics check system for efficiently checking risks related to AI ethics and provides AI development sites with the system. Currently, our AI ethics check system is under trial as a pilot project within the Group. It is scheduled to be progressively introduced to every AI development project from FY2022.

AI ethics education for all Group employees

All Group employees are receiving education in AI ethics. Ordinary employees are given basic education every year, while employees working at AI development sites or engaging in AI ethics programs are given technical education when needed. AI ethics seminars are also held regularly, at which invited lecturers discuss AI ethics issues.

24. [Sony Responsible AI Usage](#)

Sony Group's Initiatives for Responsible AI

Sony, with the aim of utilizing AI technology to enrich people's life styles and contribute to the development of society, will pursue accountability and transparency while actively engaging in dialogue with stakeholders. We will continue to promote responsible AI in order to maintain the trust of products and services by stakeholders.

Sony Group AI Ethics Guidelines

Sony established the Sony Group AI Ethics Guidelines in September 2018.

Through the utilization of artificial intelligence (AI), Sony aims to contribute to the development of a peaceful and sustainable society while delivering kando - a sense of excitement, wonder or emotion - to the world. Starting from the electronics business, Sony has continued to expand its business area and has become a diverse global company that offers entertainment such as music and movies, as well as financial services. To operate these business areas based on Sony's Purpose to "Fill the world with emotion, through the power of creativity and technology.", Sony Group AI Ethics Guidelines are hereby set forth below to ensure and promote a dialogue with various stakeholders and the proper utilization and research and development ("R&D") of AI within Sony Group.

1. Supporting Creative Life Styles and Building a Better Society

Through advancing its AI-related R&D and promoting the utilization of AI in a manner harmonized with society, Sony aims to support the exploration of the potential for each individual to empower their lives, and to contribute to enrichment of our culture and push our civilization forward by providing novel and creative types of kando. Sony will engage in sustainable social development and endeavor to utilize the power of AI for contributing to global problem-solving and for the development of a peaceful and sustainable society.

2. Stakeholder Engagement

In order to solve the challenges arising from use of AI while striving for better AI utilization, Sony will seriously consider the interests and concerns of various stakeholders including its customers and creators, and proactively advance a dialogue with related industries, organizations, academic communities and more. For this purpose, Sony will construct the appropriate channels for ensuring that the content and results of these discussions are provided to officers and employees, including researchers and developers, who are involved in the corresponding businesses, as well as for ensuring further engagement with its various stakeholders.

3. Provision of Trusted Products and Services

Sony understands the need for safety when dealing with products and services utilizing AI and will continue to respond to security risks such as unauthorized access. AI systems may utilize statistical or probabilistic methods to achieve results. In the interest of Sony's customers and to maintain their trust, Sony will design whole systems with an awareness of the responsibility associated with the characteristics of such methods.

4. Privacy Protection

Sony, in compliance with laws and regulations as well as applicable internal rules and policies, seeks to enhance the security and protection of customers' personal data acquired via products and services utilizing AI, and build an environment where said personal data is processed in ways that respect the intention and trust of customers.

5. Respect for Fairness

In its utilization of AI, Sony will respect diversity and human rights of its customers and other stakeholders without any discrimination while striving to contribute to the resolution of social problems through its activities in its own and related industries.

6. Pursuit of Transparency

During the planning and design stages for its products and services that utilize AI, Sony will strive to introduce methods of capturing the reasoning behind the decisions made by AI utilized in said products and services. Additionally, it will endeavor to provide intelligible explanations and information to customers about the possible impact of using these products and services.

7. The Evolution of AI and Ongoing Education

People's lives have continuously changed with the advance in technology across history. Sony will be cognizant of the effects and impact of products and services that utilize AI on society and will proactively work to contribute to developing AI to create a better society and foster human talent capable of shaping our collective bright future through R&D and/or utilization of AI.

AI Ethics: Promotion & Projects

Framework for AI Ethics Initiatives

The Sony Group AI Ethics Committee, established in 2019, examines AI use cases to ensure compliance with the Sony Group AI Ethics Guidelines. In 2021, the AI Ethics Office was established to provide subject matter expertise on AI ethics to all Sony business units. In addition, Sony has established a notification system for AI utilization in products, services, and internal operations in Sony Group's business units, to share information

on AI ethics risks. In March 2021, in accordance with the Sony Group AI Ethics Guidelines, Sony established an internal document stipulating requirements to be complied with in the commercialization process of electronic products and services, and in July 2021 started conducting AI ethics assessments in the product development life cycle. Sony uses e-learning tools to promote an understanding of AI ethics among its employees and invites speakers from outside the company to discuss this issue at lectures and symposia.

Stakeholder Dialogue and External Collaboration

Sony actively pursues dialogue with relevant companies, organizations, and the academic community on ethical issues surrounding AI utilization, while considering the interests of diverse stakeholders, including customers and creators. In May 2017, Sony became the first Japanese company to join the Partnership on AI to Benefit People and Society (PAI), a non-profit organization created to contribute to solutions for some of humanity's challenging problems, including advancing the understanding of AI and addressing ethics surrounding AI technology. One of the most common issues in AI ethics is that of fairness, transparency, and accountability, abbreviated as "FTA." Sony utilizes knowledge it has gained from its AI and robotics related research, development, and business ventures and contributes to a number of working groups addressing this issue. Sony chaired the Social and Societal Influences of AI Working Group, which focuses on the social impacts of AI, and currently serves as an expert advisor for PAI's strategic planning. Sony also serves on the steering committee for ABOUT ML,* an initiative to improve the transparency of machine learning. Sony also serves as an expert advisor to the Explainability Research Project and Diversity and Inclusion Research Project.

* ABOUT ML stands for "Annotation and Benchmarking on Understanding and Transparency of Machine Learning Lifecycles."

Sony's Global Head of AI Ethics is also one of the General Chairs of the 2022 ACM Conference on Fairness, Accountability, and Transparency (FAccT), the premier conference on sociotechnical algorithmic systems. Sony is also involved with Japanese initiatives to establish principles and guidelines that promote the utilization of AI for social good. These initiatives include the AI Utilization Strategy published by Keidanren (Japan Business Federation) in February 2019 and the Social Principles of Human-centric AI published by Japan's Cabinet Office in March 2019. Sony is currently a member of the Conference toward AI Network Society, a group within the Ministry of Internal Affairs and Communications whose goal is the comprehensive study of the social, economic, ethical, and legal factors involved in the promotion of AI networks throughout society as a whole. Additionally, Sony is a participant in the Global Partnership on AI, an initiative launched in June 2020 to promote the development and utilization of AI based on human-centric principles, and serves as a member of the AI and Pandemic Response Subgroup, a working group that aids the development of responsible AI solutions for epidemics of infectious disease such as COVID-19. Trusted R&D for AI

Sony pursues R&D for AI that is trusted and backed by solid technologies, and is engaged in technical initiatives related to AI ethics. As a solution for securing FTA, Sony equipped its AI development tool Neural Network Console with eXplainable AI (XAI) to make it easy to use. XAI is a technology that enables people to understand the logic behind AI decision-making, an area often called the "black box" since it is not always immediately apparent. Sony has also released its machine learning fairness library and Responsible AI XAI source code as open source software.

Additionally, Sony provided its Prediction One predictive analysis tool with the ability to visualize the predictive reasoning. In 2021, Sony also launched the AI ethics flagship within Sony AI with projects to conduct cutting-edge research on the challenges faced in the development of AI products and services, including ethical data collection and algorithmic fairness. Taking advantage of its position as a company that extends across a wide range of industries, Sony will put fair and transparent AI into practice, leveraging its global and diverse perspective. Related Sony Group Initiatives

Integrity and Sincerity are the key Values to achieving Sony's Purpose. The Sony Group Code of Conduct sets forth a standard of daily behavior based on these Values. The Code of Conduct supports Sony's value creation and serves as the basis for earning the trust for the Sony brand through the ethical and responsible conduct of every Sony Group employee.

[Sony Group Code of Conduct](#)

Sony's policy on respect for human rights is stipulated in the Sony Group Code of Conduct. All Group companies are required to respect human rights and conduct sincere business operations in accordance with this policy and any related laws and regulations. In regards to ethical issues related to the use of AI, we are responding sincerely from the perspective of fairness and transparency while engaging in dialogue with stakeholders.

[Sony's Approach to Respect for Human Rights](#)

Sony, with regard to its philosophy and basic policy on product quality and customer service, aims to improve quality and customer service from the customer's point of view in a way that can provide customers with a sense of "satisfaction", "trust", and "safety".

[Commitment to Quality and Customer Service](#)

In order to protect the privacy and personal information of customers, employees and other stakeholders, Sony carries out continuous activities under a system of governance over the entire Group in such a way that allows us to effectively manage potential risks and incorporate measures to protect privacy into our systems and products, and we are working hard on the utilization of AI as part of these activities.

[Protection of Privacy and Personal Information](#)

[25. ASMPT 2023 Interim Report](#)

CHAIRMAN'S STATEMENT RESULTS SUMMARY ASMPT Limited and its subsidiaries (the "Group" or "ASMPT") delivered revenue of HK\$7.82 billion (US\$997.5 million) for the six months ended 30 June 2023, a decline of 25.3% YoY and 12.1% HoH. The Group's consolidated profit after taxation for the first half of 2023 was HK\$623.1 million, a decline of 64.1% YoY and 29.5% HoH. Basic earnings per share for the six months ended 30 June 2023 was HK\$1.52, a decline of 63.9% YoY and 29.3% HoH. DIVIDEND The Board of Directors of ASMPT Limited (the "Company") has declared an interim dividend of HK\$0.61 (2022: HK\$1.30) per share, payable to shareholders whose names appear on the Register of Members of the Company on 18 August 2023. MANAGEMENT DISCUSSION AND ANALYSIS The performance review for the first six months of 2023 will begin with notable business highlights, followed by a financial

review of the Group and its Segments: the Semiconductor Solutions Segment (“SEMI”) and SMT Solutions Segment (“SMT”). 1H 2023 Group Business Highlights For the first half of 2023, the Group continued to be impacted by weak industry conditions, marked by conservative consumer spending and capex investment, and on-going inventory digestion. SMT continued its resilient performance and its revenue exceeded that of SEMI for the fourth consecutive quarter. Recovery for SEMI is taking longer than anticipated as factory utilisation of its customer base, while showing gradual improvement, has not yet reached optimum levels. Amidst a prolonged semiconductor downturn, the Group’s unique and broad portfolio, coupled with its role as a key partner in the technology roadmaps of major customers, provides strong foundations for future growth. In particular, the Group stands to benefit from Advanced Packaging (“AP”), driven by strong growth in generative AI and High Performance Computing (“HPC”), as well as Automotive. AP: Positioned Well for Generative AI and HPC Growth The Group’s AP solutions delivered 1H 2023 revenue of about US\$195 million, or 19% of Group revenue, with its Thermo Compression Bonding (“TCB”) solutions contributing the most to this AP revenue. MANAGEMENT DISCUSSION AND ANALYSIS (Continued) 1H 2023 Group Business Highlights (Continued) AP: Positioned Well for Generative AI and HPC Growth (Continued) The Group is in deep collaborations with key customers to enable the strong growth in generative AI, which requires high precision bonding solutions and optimal total cost of ownership: TCB: The Group is in a commanding position to address crucial logic and memory packaging bottlenecks in generative AI. For logic, the Group is enabling major customers in Chip-to-Wafer and Chip-to-Substrate processes that are critical for the heterogeneous integration and assembly of AI computing packages in increasingly sophisticated configurations. For high-bandwidth memory (“HBM”), the Group’s solutions fulfil demanding packaging requirements for next-generation HBM. As generative AI proliferates, customers will migrate to these advanced HBM packages to meet increased storage and processing demands. The Group’s TCB solutions are capable of handling a variety of interconnect types. It is uniquely positioned to benefit from the accelerated adoption of TCB due to the increasing number of interconnects required by complex AI packages. Order flow for logic is promising from foundry and OSAT customers. In particular, demand from its foundry customer base is growing due to expansion for AP capacity. For memory, the Group won repeat orders for HBM and it continues to engage deeply with multiple memory players. The Group is therefore confident of more TCB order flow for both logic and memory in 2H 2023. Other AP: The Group’s Mass Reflow High Precision Die-bonding solutions are benefitting from generative AI, with continuous order flow from top tier global customers. In Hybrid Bonding, the Group continues its engagement with key customers for qualification in various end-market applications, including memory. Generative AI’s increasing demand also benefits other tools in the Group’s portfolio: Silicon Photonics (“SiPh”): The high placement accuracy of the Group’s market leading solutions are relevant for SiPh and Co-Packaged Optic devices such as optical transceivers and photonic engines. The Group received repeat orders for its tools to support a key customer’s transceiver expansion plans to meet generative AI’s high bandwidth transfer requirements and it expects more such orders in 2H 2023. SMT Placement Tools: There is traction in the server business driven by AI applications for the Group’s SMT placement tools that provide flexibility for customers in terms of handling larger server board weights and sizes. The complex chip architectures required by generative AI and HPC packages are also benefitting the Group’s Laser Singulation solutions, which have seen preliminary engagements with global IDMs, as well as its market-leading Panel Electrochemical Deposition Tools that serve HPC applications requiring more advanced substrates with larger form factors and finer line/space. Automotive Contributing

Strongly, but Normalising For 1H 2023, the Group's Automotive end market applications contributed the highest proportion of Group revenue at approximately US\$230 million or 23% of 1H 2023 Group revenue. This contribution spanned across the Group's mainstream solutions, particularly SMT placement tools, molding tools and die bonders. While the Group's Automotive solutions have contributed strongly to its overall performance in the last two years, this sector has begun to normalise. Nevertheless, demand from EV players and for Silicon Carbide applications remain robust. The Group's Automotive solutions continue to bag design wins that will eventually translate into High Volume Manufacturing demand. 1H 2023 Group Financial Review Group Revenue declined YoY and HoH, due mostly to SEMI, while SMT revenue held steady. Group revenue was influenced by the following: (i) The Automotive market had the highest contribution to Group revenue at approximately 23%, mostly from mainstream solutions across both SMT and SEMI; (ii) The Industrial market remained robust and contributed about 18% to Group revenue, mostly from SMT; and (iii) The Consumer, Communication and Computers markets combined continued to be weak due to market sentiment. Geographically, contribution from China (including Hong Kong) declined YoY and its share of Group revenue was reduced from 44% to 30%, while revenue from Europe and the Americas grew from 15% to 30% and 9% to 19%, respectively. Customer concentration risk continued to remain low for the Group with its top five customers accounting for approximately 20% of 1H 2023 revenue. Group bookings decreased slightly by 2.7% HoH due to SMT, while SEMI grew from a low base. Bookings declined 43.9% YoY, mainly due to a high base effect. Contributions from AP, Automotive and Industrial end markets accounted for approximately 57% of Group bookings in 1H 2023. The Group ended 1H 2023 with a backlog of HK\$7.78 billion (US\$992.6 million) and a book-to-bill ratio of 0.84. Group gross margin declined slightly, partly due to segment mix as SMT contributed about 59% to Group revenue in 1H 2023. The Group's operating margin and net profit YoY and HoH were adversely impacted by lower sales volume. As of 30 June 2023, the Group maintained a healthy liquidity position with gross cash and bank deposits totalling HK\$3.77 billion while bank borrowings were at HK\$2 billion. MANAGEMENT DISCUSSION AND ANALYSIS (Continued) Q2 2023 Group Financial Review Group Q2 revenue was flat QoQ, while bookings declined due to the ongoing industry downcycle. Both revenue and bookings declined YoY mainly due to a high base effect. Group gross margin declined, mainly due to SEMI, but was partially offset by margin improvement from SMT. The Group's overall profitability declined marginally QoQ, while YoY declines were due to lower sales volume. SEMI contributed about 42% to Group Q2 2023 revenue. Revenue increased QoQ from a low base. Revenue for the segment was mainly impacted by the following developments in its Business Units ("BU"): (i) The IC/Discrete BU had stable QoQ revenue, with the highest revenue contribution from TCB. There was also some uptick in the contribution from the BU's mainstream tools. (ii) The Optoelectronics BU recorded higher revenue QoQ. Revenue growth was mainly driven by wire bonders for Conventional Displays. The BU's high-end Silicon Photonics applications also registered growth. (iii) The CIS BU's revenue remained relatively low due to continued weakness in the global smartphone market. SEMI bookings declined QoQ and YoY due to the ongoing semiconductor downcycle, while the declines in its gross margin QoQ and YoY were due to a higher mix of wire bonders and volume effects, respectively. SMT's revenue performance remained relatively stable, contributing about 58% of Group Q2 2023 revenue. Industrial and Automotive applications combined made up almost half of SMT revenue with demand mostly from Europe. SMT has enjoyed a high level of bookings for more than two years and entered a normalisation phase. SMT bookings were driven mostly by Industrial and Automotive end-markets. Segment gross margin increased QoQ and YoY mainly

due to a favourable product mix. **OUTLOOK** The Group's growth prospects remain strong due to long term structural trends of automotive electrification, smart factories, green infrastructure, 5G, IoT, and HPC fuelled by generative AI growth. The Group has a key competitive advantage as a major supplier and technology partner across many applications and solution areas. Near term visibility continues to be limited due to uncertainty in the macroeconomic environment, marked by persistent inflation, tepid consumer sentiment and ongoing inventory digestion. With these considerations in mind, the Group expects revenue for Q3 2023 to be between US\$410 million to US\$480 million (-23.4% YoY and -10.5% QoQ at midpoint), mainly due to SMT normalising.

RESEARCH AND DEVELOPMENT The Group's continued commitment to investing in research and development ("R&D") across the industry cycles is critical to its objective of remaining at the forefront of technology development. This emphasis on R&D positions the Group well to capitalize on technological breakthroughs required for tapping secular growth opportunities. A good example is the Group's investment in progressively evolving TCB solutions, putting it in a commanding position to address current industry bottlenecks and capture growth from generative AI and HPC demand. With a global workforce of more than 2,500, the Group operates several R&D centres worldwide: the Americas (Boston), Asia (Chengdu, Hong Kong, Huizhou, Sanhe, Shenzhen, Suzhou, Singapore and Taoyuan) and Europe (Beuningen, Munich, Porto, Regensburg and Weymouth). For 1H 2023, the Group invested around HK\$1 billion in R&D. To date, the Group has delivered about 2,000 patents and patent applications.

CHAIRMAN'S STATEMENT (CONTINUED) LIQUIDITY AND FINANCIAL RESOURCES Cash and bank deposits as of 30 June 2023 were HK\$3.77 billion (31 December 2022: HK\$4.42 billion). Capital additions during the period amounted to HK\$227.8 million (1H 2022: HK\$212.9 million), which was fully funded by the period's depreciation and amortization of HK\$244.6 million (1H 2022: HK\$249.1 million), excluding the depreciation of right-of-use assets of HK\$110.0 million (1H 2022: HK\$114.9 million) due to HKFRS 16 application. As of 30 June 2023, the debt-to-equity ratio was 0.127 (31 December 2022: 0.142). The Group had available banking facilities of HK\$3.42 billion (US\$435.8 million) (31 December 2022: HK\$3.40 billion (US\$435.6 million)) in the form of bank loans and overdraft facilities, of which HK\$1.87 billion (US\$238.3 million) (31 December 2022: HK\$1.86 billion (US\$238.5 million)) were committed borrowing facilities. Bank borrowings, which are mainly to support day-to-day operations and capital expenditure, are denominated in Hong Kong dollars. The Group had unsecured bank borrowings of HK\$2.00 billion as of 30 June 2023 (31 December 2022: HK\$2.25 billion), consisting of variable-rate syndicated loan. These bank borrowings are repayable by instalments. The syndicated loan is repayable by instalments from March 2022 to March 2024. The Group uses interest rate swaps to mitigate its exposure of the cash flow changes of the variable-rate syndicated loan by swapping HK\$1.75 billion (31 December 2022: HK\$1.75 billion) of the syndicated loan from variable rates to fixed rates. The Group's equity attributable to owners of the Company was HK\$15.60 billion as of 30 June 2023 (31 December 2022: HK\$15.74 billion). As of 30 June 2023, cash holdings of the Group were mainly in US dollars, Euros and Chinese RMB. The Group entered into HK dollar and Euro hedging contracts to mitigate foreign currency exposure of the inter-company loans denominated in Euro. SMT entered into US dollar and Euro hedging contracts to mitigate foreign currency risks, as a significant portion of the production of SMT equipment and its suppliers are located in Europe, while a substantial part of the Group's revenue for SMT equipment is denominated in US dollars. In terms of currency exposure, the majority of the Group's sales and disbursements in respect of operating expenses and purchases were mainly in US dollars, Euros and Chinese RMB.

SIGNIFICANT INVESTMENT As at 30 June 2023,

Advanced Assembly Materials International Limited (“AAMI”) was regarded as a significant investment of the Group as the value of the Group’s investment in AAMI comprised 5% or more of the Group’s total assets. Save as disclosed in this announcement, the information pursuant to paragraph 32(4A) of Appendix 16 to the Rules Governing the Listing of Securities on The Stock Exchange of Hong Kong Limited (“Listing Rules”) in relation to the Group’s investment in AAMI has not changed materially from the information disclosed in the most recent published annual report.

CHAIRMAN’S STATEMENT (CONTINUED) HUMAN RESOURCES The Group deeply appreciates the contributions of its employees worldwide for their unwavering commitment during an industry downturn. Several cost optimisation measures were put in place to mitigate the effects of the downturn and they were well supported by the Group’s employees, exhibiting a true team spirit. At the same time, the Group’s HR efforts continue to focus on introducing and enhancing initiatives that create an inclusive and positive work culture and employee experience. As part of these measures, the Group recently successfully launched the ‘Global People System’, a global HR system aimed at improving the entire employee digital experience, which encompasses transactions, engagement, growth and development. This HR system has already been implemented for Asia and the Americas and will soon be rolled out for Europe. Other recent HR initiatives include the kick-off for the establishment of global job grades and career structures and a Leadership Development Centre, which will collectively strengthen the Group’s leadership pipeline and succession efforts. As of 30 June 2023, total headcount for the Group was approximately 11,300, which excludes some 700 flexi workers and outsourced workers. Of this 11,300, approximately 1,000 are based in Hong Kong, 5,100 in mainland China, 1,100 in Singapore, 1,100 in Germany, 900 in Malaysia, 400 in Portugal, 400 in the United Kingdom, 400 in the United States, and the rest in other parts of the world. Total manpower costs for the Group for 1H 2023 was HK\$2.49 billion versus HK\$2.68 billion over the same period in 2022. The Group continues its commitment to fairly remunerate its employees while manoeuvring through the prolonged semiconductor downcycle with a prudent and measured approach towards managing overall manpower costs.

REPORT ON REVIEW OF CONDENSED CONSOLIDATED FINANCIAL STATEMENTS TO THE BOARD OF DIRECTORS OF ASMPT LIMITED (incorporated in the Cayman Islands with limited liability) INTRODUCTION We have reviewed the condensed consolidated financial statements of ASMPT Limited (the “Company”) and its subsidiaries (collectively referred to as the “Group”) set out on pages 13 to 42, which comprise the condensed consolidated statement of financial position as of 30 June 2023 and the related condensed consolidated statement of profit or loss, statement of profit or loss and other comprehensive income, statement of changes in equity and statement of cash flows for the six months then ended, and certain explanatory notes. The Rules Governing the Listing of Securities on The Stock Exchange of Hong Kong Limited require the preparation of a report on interim financial information to be in compliance with the relevant provisions thereof and the Hong Kong Accounting Standard 34 “Interim Financial Reporting” (“HKAS 34”) issued by the Hong Kong Institute of Certified Public Accountants. The directors of the Company are responsible for the preparation and presentation of these condensed consolidated financial statements in accordance with HKAS 34. Our responsibility is to express a conclusion on these condensed consolidated financial statements based on our review, and to report our conclusion solely to you, as a body, in accordance with our agreed terms of engagement, and for no other purpose. We do not assume responsibility towards or accept liability to any other person for the contents of this report.

SCOPE OF REVIEW We conducted our review in accordance with Hong Kong Standard on Review Engagements 2410 “Review of Interim Financial Information Performed by the Independent

Auditor of the Entity” issued by the Hong Kong Institute of Certified Public Accountants. A review of these condensed consolidated financial statements consists of making inquiries, primarily of persons responsible for financial and accounting matters, and applying analytical and other review procedures. A review is substantially less in scope than an audit conducted in accordance with Hong Kong Standards on Auditing and consequently does not enable us to obtain assurance that we would become aware of all significant matters that might be identified in an audit. Accordingly, we do not express an audit opinion.

CONCLUSION Based on our review, nothing has come to our attention that causes us to believe that the condensed consolidated financial statements are not prepared, in all material respects, in accordance with HKAS 34.

NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS For the six months ended 30 June 2023

1. BASIS OF PREPARATION The condensed consolidated financial statements have been prepared in accordance with the applicable disclosure requirements of Appendix 16 to the Rules Governing the Listing of Securities on The Stock Exchange of Hong Kong Limited (the “Stock Exchange”) and with the Hong Kong Accounting Standard 34 “Interim Financial Reporting” issued by the Hong Kong Institute of Certified Public Accountants (the “HKICPA”). The condensed consolidated financial statements do not include all the information required for a complete set of Hong Kong Financial Reporting Standards financial statements and should be read in conjunction with the Group’s annual consolidated financial statements as at 31 December 2022.

2. PRINCIPAL ACCOUNTING POLICIES The condensed consolidated financial statements have been prepared on the historical cost basis except for the derivative financial instruments, other investments, other financial assets and certain financial liabilities which are measured at fair value at the end of reporting period. Other than changes in accounting policies resulting from application of amendments to Hong Kong Financial Reporting Standards (“HKFRSs”), the accounting policies and methods of computation used in the condensed consolidated financial statements for the six months ended 30 June 2023 are consistent with those followed in the preparation of the Group’s annual consolidated financial statements for the year ended 31 December 2022.

Application of amendments to HKFRSs In the current interim period, the Group has applied the following amendments to HKFRSs issued by the HKICPA, for the first time, which are mandatorily effective for the Group’s annual period beginning on 1 January 2023 for the preparation of the Group’s condensed consolidated financial statements: HKFRS 17 (including the October 2020 and February 2022 Amendments to HKFRS 17) Insurance Contracts Amendments to HKAS 1 and HKFRS Practice Statement 2 Disclosure of Accounting Policies Amendments to HKAS 8 Definition of Accounting Estimates Amendments to HKAS 12 Deferred Tax related to Assets and Liabilities arising from a Single Transaction Except as described below, the application of the amendments to HKFRSs in the current interim period has had no material impact on the Group’s financial positions and performance for the current and prior periods and/or on the disclosures set out in these condensed consolidated financial statements.

NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED) For the six months ended 30 June 2023

2. PRINCIPAL ACCOUNTING POLICIES (Continued) Application of amendments to HKFRSs (Continued) Impacts and changes in accounting policies on application of Amendments to HKAS 12 Deferred Tax related to Assets and Liabilities arising from a Single Transaction Accounting policies Deferred tax is recognised on temporary differences between the carrying amounts of assets and liabilities in the condensed consolidated financial statements and the corresponding tax bases used in the computation of taxable profit. Deferred tax liabilities are generally recognised for all taxable temporary differences. Deferred tax assets are generally recognised for all deductible temporary differences to the extent that it is probable that taxable

profits will be available against which those deductible temporary differences can be utilised. Such deferred tax assets and liabilities are not recognised if the temporary difference arises from the initial recognition (other than in a business combination) of assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit and at the time of the transaction does not give rise to equal taxable and deductible temporary differences. In addition, deferred tax liabilities are not recognised if the temporary difference arises from the initial recognition of goodwill. Transition and summary of effects As disclosed in the Group's annual financial statements for the year ended 31 December 2022, the Group previously applied the HKAS 12 Income Taxes requirements to assets and liabilities arising from a single transaction as a whole and temporary differences relating to the relevant assets and liabilities were assessed on a net basis. Upon the application of the amendments, the Group assessed the relevant assets and liabilities separately. The Group also recognised a deferred tax asset (to the extent that it is probable that taxable profit will be available against which the deductible temporary difference can be utilised) and a deferred tax liability for all deductible and taxable temporary difference associated with right-of-use assets and lease liabilities. The application of the amendments has had no material impact on the Group's financial position and performance. NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED) For the six months ended 30 June 2023 3. SEGMENT INFORMATION The Group has two (2022: two) operating segments: development, production and sales of (1) semiconductor solutions and (2) surface mount technology solutions. They represent two (2022: two) major types of products manufactured by the Group. The operating segments are identified on the basis of internal reports about components of the Group that are regularly reviewed by the Company's Chief Executive Officer, the chief operating decision maker ("CODM"), for the purpose of allocating resources to segments and assessing their performance. The Group is organised and managed around the two (2022: two) major types of products manufactured by the Group. No operating segments have been aggregated in arriving at reportable segments of the Group. Segment results represent the profit before taxation earned by each segment without allocation of interest income, finance costs, unallocated other income and other gain, unallocated net foreign exchange gain and fair value change of foreign currency forward contracts, unallocated general and administrative expenses, share of result of a joint venture and other expenses. NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED) For the six months ended 30 June 2023 3. SEGMENT INFORMATION (Continued) Segment revenue and results (Continued) No analysis of the Group's assets and liabilities by operating segment is disclosed as they are not regularly provided to the CODM for review. All of the segment revenue derived by the segments is from external customers. NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED) For the six months ended 30 June 2023 7. INCOME TAX EXPENSE (Continued) Current tax: (Continued) (c) ASMPT Singapore Pte. Ltd. ("ATS") has been granted a Pioneer Certificate ("PC") to the effect that profits arising from the manufacture of certain semiconductor products are exempted from tax for a period of 10 years effective from 1 January 2022 to 31 December 2031 across specified products, subject to fulfillment of certain criteria during the relevant periods. ATS has also been granted a Development and Expansion Incentive ("DEI") to the effect that certain income arising from qualifying activities conducted by ATS, are subject to a concessionary tax rate for a period of 10 years from 1 January 2021 to 31 December 2030, subject to fulfillment of certain criteria during the relevant period. Income of ATS arising from activities not covered under the PC or DEI are taxed at the prevailing corporate tax rate in Singapore of 17% (for the six months ended 30 June 2022: 17%). (d) The calculation of

current tax of the Group's subsidiaries in Germany is based on a corporate income tax rate of 15.00% (for the six months ended 30 June 2022: 15.00%) plus 5.50% (for the six months ended 30 June 2022: 5.50%) solidarity surcharge on the corporate income tax for the assessable profit for the period which derives at tax rate of 15.825% (for the six months ended 30 June 2022: 15.825%). In addition to corporate income tax, trade tax is levied on taxable income. The applicable German trade tax (local income tax) rates for the Group's subsidiaries in Germany vary from 11.187% to 17.150% (for the six months ended 30 June 2022: 12.465% to 17.150%) according to the municipal in which the entity resides. Thus the aggregate tax rates were between 27.012% and 32.975% (for the six months ended 30 June 2022: between 28.290% and 32.975%). (e) Taxation for other jurisdictions is calculated at the rates prevailing in the relevant jurisdictions. The deferred tax credit is mainly related to the tax effect of temporary difference between the tax base of certain assets and liabilities and the carrying value of the assets and liabilities. The balance mainly includes deductible temporary differences arising from retirement benefit obligations, provisions, inventories, trade receivables, right-of-use assets and lease liabilities.

13. PROVISIONS (Continued) Based on the subsidiary's consultant's report and the directors' estimate of the expenditure required to settle the Group's obligations in relation to the litigation, a provision of approximately HK\$39,239,000 (31 December 2022: HK\$38,985,000) was made. The remaining is mainly provision for restoration of right-of-use assets.

14. BANK BORROWINGS At 30 June 2023, the bank borrowings bear interest at HIBOR plus a margin per annum (for the six months ended 30 June 2022: fixed-rate interest or interest at LIBOR or HIBOR plus a margin per annum), at an effective interest rate 2.84% (31 December 2022: 3.11%) per annum. During the six months ended 30 June 2023, the Group repaid bank borrowings of HK\$250,000,000 (for six months ended 30 June 2022: HK\$289,662,000). During the six months ended 30 June 2022, the Group obtained new bank borrowings amounting to HK\$639,238,000 (for six months ended 30 June 2023: nil). Note: Included in variable-rate borrowings were bank loans of HK\$1,750,000,000 (31 December 2022: HK\$1,750,000,000) which were under cash flow hedges. The interest rates for the borrowings are fixed to 2.315% and 2.38% under the interest rate swap contracts with the maturity date on 21 March 2024.

NOTES TO THE CONDENSED CONSOLIDATED FINANCIAL STATEMENTS (CONTINUED) For the six months ended 30 June 2023

16. SHARE-BASED PAYMENTS At the annual general meeting of the Company held on 7 May 2019, the shareholders approved the adoption of an Employee Share Incentive Scheme (the "Scheme") commencing on 24 March 2020 (the "Adoption Date"), under which shares of the Company (the "Awarded Shares") may be allocated or awarded to employees or directors of the Company and certain subsidiaries as determined by the Board (the "Selected Employees"). Unless otherwise cancelled or amended, the Scheme will remain valid and effective for a period of ten years from the Adoption Date. Details of the Scheme were set out in the Company's circular to shareholders dated 1 April 2019. During the year ended 31 December 2022, the directors resolved to contribute HK\$240 million to the Scheme, pursuant to which an independent professional trustee appointed by the Board under the Scheme ("Trustee") to subscribe or purchase 3,148,600 shares in the Company for the benefits of certain employees and members of the management of the Group who shall remain in employment within the Group upon the expiration of vesting period on 15 December 2022 (the "2022 Vesting Date"). The Trustee (i) purchased a total of 429,700 shares in the Company on the Stock Exchange, and (ii) subscribed 2,633,700 shares in the Company, prior to the 2022 Vesting Date. On the 2022 Vesting Date, the Trustee transferred 438,400 shares purchased on the Stock Exchange (included 8,700 shares purchased during the year ended 31 December 2021) and 2,633,700 subscribed shares to certain Selected Employees who are

connected persons and not connected persons of the Company respectively. During the year ended 31 December 2022, 76,500 share entitlements were forfeited and unallocated by the Company. During the period ended 30 June 2023, the directors resolved to contribute HK\$181 million to the Scheme, and a total of 2,447,000 shares in the Company are expected to be vested in Selected Employees upon the expiration of the next vesting period on 15 December 2023. The Trustee has purchased a total of 361,500 shares in the Company on the Stock Exchange. The fair values of the shares awarded pursuant to the Scheme in 2022 and 2023 were determined with reference to the market value of the shares at the award date taking into account the exclusion of the expected dividends as the employees were not entitled to receive dividends paid prior to the vesting of the shares. The Group recognised share-based payments for the six months ended 30 June 2023 amounting to HK\$65,283,000 (for the six months ended 30 June 2022: HK\$85,630,000) in relation to the shares awarded pursuant to the Scheme by the Company, such amount being determined by the fair value of the shares awarded at the award dates.

17. RELATED PARTY TRANSACTIONS

Compensation of key management personnel During the period, the emoluments of directors and other members of key management were HK\$31,865,000 (for the six months ended 30 June 2022: HK\$31,350,000). Certain shares of the Company were awarded to the members of key management under the Scheme (see note 16 for details of the Scheme). The estimated fair value of such shares included in the emoluments above amounted to HK\$8,607,000 (for the six months ended 30 June 2022: HK\$12,462,000) for the six months ended 30 June 2023.

Service income and sales to a joint venture and its affiliates During the period, there are sales of spare parts to a joint venture and its affiliates of HK\$1,706,000 (for the six months ended 30 June 2022: HK\$9,893,000) and rental services of HK\$5,589,000 (for the six months ended 30 June 2022: HK\$6,468,000).

18. ACQUISITION OF SUBSIDIARIES On 30 September 2021, the Group entered into a purchase agreement to acquire 100% equity interest in Automation Engineering, Inc. (“AEi”), a company based in Tewksbury, Massachusetts, USA, at a purchase price of US\$23,107,000 (equivalent to approximately HK\$180,188,000) (“AEi Acquisition”). AEi engages in the automotive camera active alignment market. The AEi Acquisition was completed on 1 February 2022 and has been accounted for using the acquisition method. For details regarding the AEi Acquisition, please refer to 2022 Annual Report.

Acquisition of Beijing Borey Advanced Technology Co., Ltd. (“Borey”) On 13 April 2023, the Group entered into a share purchase agreement to acquire 100% equity interest in Borey, a company based in PRC, at a purchase price of RMB27,000,000 (equivalent to approximately HK\$30,842,000), subject to certain adjustments as set out in the share purchase agreement (“Borey Acquisition”). Borey engages in the surface mount technology electronic assembly equipment. The Borey Acquisition was completed on 28 April 2023 and has been accounted for using the acquisition method. Acquisition-related costs have been excluded from the cost of acquisition and recognised as an expense in the period when incurred within the “general and administrative expenses” line item in the condensed consolidated statement of profit or loss. Cumulative acquisition-related costs in respect of the Borey Acquisition amounted to HK\$2,091,000, of which HK\$1,635,000 was charged to profit or loss in the current period with the remaining amount charged to profit and loss in prior year.

18. ACQUISITION OF SUBSIDIARIES (Continued) Acquisition of Beijing Borey Advanced Technology Co., Ltd. (“Borey”) (Continued) The trade receivables acquired in this acquisition had a fair value of HK\$954,000, which was the same as the related gross contractual amount. It would be the best estimate from management at acquisition date of the contractual cash flows expected to be collected. Goodwill arose in Borey Acquisition because the cost of the combination includes a control premium. In addition, the consideration paid for the combination effectively included an

amount in relation to the benefit of the expected cost synergies and technological integration of surface mount technology. These benefits are not recognised separately from goodwill because they do not meet the recognition criteria for identifiable intangible assets. The initial accounting for goodwill acquired in the above business combination with the fair value HK\$22,162,000 has been determined on a provisional basis. The amount of goodwill and intangible assets may be adjusted accordingly upon the completion of initial accounting year which shall not exceed one year from the acquisition date. Acquisition of Soft Rock Technologies Sdn. Bhd. (“SRT”) On 7 February 2023, the Group entered into a share purchase agreement to acquire 100% equity interest in SRT, a company based in Malaysia, at a purchase price of MYR7,033,000 (equivalent to approximately HK\$12,902,000), subject to certain adjustments as set out in the share purchase agreement (“SRT Acquisition”). SRT is a software development company with expertise in process and factory automation. The SRT Acquisition was completed on 16 February 2023 and has been accounted for using the acquisition method. Acquisition-related costs have been excluded from the cost of acquisition and recognised as an expense in the period when incurred within the “general and administrative expenses” line item in the condensed consolidated statement of profit or loss. Cumulative acquisition-related costs in respect of the SRT Acquisition amounted to HK\$856,000, of which HK\$110,000 was charged to profit or loss in the current period with the remaining amount charged to profit and loss in prior year. Assets acquired and liabilities recognised at the date of acquisition are as follows (determined on a provisional basis):

SUBSTANTIAL SHAREHOLDERS’ INTERESTS IN SHARES As at 30 June 2023, the following persons (other than the interests disclosed above in respect of directors or chief executives of the Company) had interests or short positions in the share capital of the Company as recorded in the register required to be kept by the Company under Section 336 of the SFO:

CORPORATE GOVERNANCE The Company has complied with all the code provisions set out in the Corporate Governance Code (the “CG Code”) contained in Appendix 14 of the Listing Rules throughout the six months ended 30 June 2023. The Company reviews its corporate governance practices regularly to ensure compliance with the CG Code. The Company has adopted the Model Code as set out in Appendix 10 of the Listing Rules. Specific enquiry has been made to all directors of the Company, and all of the directors have confirmed that they have complied with the Model Code throughout the six months ended 30 June 2023.

AUDIT COMMITTEE The Audit Committee of the Company (the “Audit Committee”) comprises four Independent Non-Executive Directors and one Non-Executive Director who together have substantial experience in the fields of auditing, legal matters, business, accounting, corporate internal control and regulatory affairs.

REVIEW OF FINANCIAL STATEMENTS The Audit Committee has reviewed the Group’s unaudited condensed consolidated financial statements for the six months ended 30 June 2023 in conjunction with the Company’s external auditor.

EMPLOYEE SHARE INCENTIVE SCHEME The Company has adopted the Employee Share Incentive Scheme (the “Scheme”) for the benefit of the Group’s employees and members of management. The specific objectives of the Scheme are (i) to recognise the contributions by certain employees and to provide them with incentives in order to retain them for the continual operation and development of the Group; and (ii) to attract suitable personnel for further development of the Group. The Scheme was approved by the shareholders of the Company at the Company’s annual general meeting held on 7 May 2019, and adopted by the Company on 24 March 2020 (the “Adoption Date”). Under the Scheme, the shares of the Company may be allocated or awarded to employees or directors of the Group as selected by the Board. The Scheme will be valid and effective for a period of ten years commencing from the Adoption Date.

PURCHASE, SALE OR REDEMPTION OF THE COMPANY’S LISTED

SECURITIES During the six months ended 30 June 2023, neither the Company nor any of its subsidiaries purchased, sold or redeemed any of the Company’s listed securities except that an independent professional trustee appointed by the Board under the Scheme, pursuant to the terms of the rules and trust deed of the Scheme, purchased on the Stock Exchange a total of 361,500 shares in the Company at a total consideration of approximately HK\$22.8 million (excluding ancillary trading fees, costs and expenses directly attributable to the purchase). **CLOSURE OF REGISTER OF MEMBERS** For the purpose of determining shareholders’ entitlement to the interim dividend, the Register of Members of the Company will be closed from 16 August 2023 to 18 August 2023, both days inclusive, during which period no share transfers can be registered. In order to qualify for the interim dividend, all transfers accompanied by the relevant share certificates, must be lodged with Company’s Share Registrar in Hong Kong, Tricor Secretaries Limited, at 17/F, Far East Finance Centre, 16 Harcourt Road, Hong Kong, not later than 4:00 p.m. on 15 August 2023. The interim dividend will be paid on or about 31 August 2023.

26. [Infosys Responsible AI](#)

Overview

While enterprises around the world harness AI’s rapid advancements to unlock business value, they are also getting exposed to their fair share of risks like bias, security threats, privacy violations, copyright infringement, hallucinations, and malicious use, to name a few. Lack of transparency and mechanisms to enforce strong principles of Responsible AI are some of the key hurdles enterprises face.

The regulation and policy landscape is also evolving rapidly, and upcoming legislations like the EU AI Act are putting different obligations on all participants across the AI value chain to adopt specific standards and safeguards. It has now become imperative for enterprises to build technical and policy-driven guardrails to safeguard themselves against any hazards without which they could suffer from loss of reputation, incur hefty penalties from regulators, and face costly litigations from those adversely affected and cause irreparable harm to all stakeholders.

Infosys Responsible AI suite of offerings and services, part of Infosys Topaz, is designed to help enterprises navigate the complex technical, policy, and governance challenges related to embedding strong foundations of Responsible AI across the organization. These offerings have helped Infosys in its journey to become AI-first.

Infosys Responsible AI Suite of Offerings is built on the AI3S Framework, helping enterprises scope out, secure, and spearhead their AI investments.

[TALK TO OUR EXPERTS](#)

Implementing Responsible AI in enterprises presents a unique set of challenges balancing innovation, ethics, legal compliance, and maximizing return on investments. Ensuring responsible AI practices throughout the supply chain, especially when using multiple AI systems, requires state-of-the-art technical, legal, and domain expertise.

Even with well-established guidelines and governance mechanisms, enterprises can encounter several challenges. Enterprises are caught in the “Responsible AI Gap” - an inability to translate principles and frameworks into tangible actions.

Our Responsible AI Suite is based on the AI3S framework of Scan, Shield, and Steer, built on an end-to-end autonomous platform approach to Scope, Secure, and Spearhead enterprises' AI solutions and platforms.

The Infosys AI3S Suite of responsible AI offerings - Scan, Shield, and Steer helps our customers adopt AI responsibly.

SCAN

We help our clients identify the overall risk posture, legal obligations, vulnerabilities, and threats arising due to AI adoption using a set of offerings named 'Scan' that collate information from multiple external and internal sources and create a single source of truth for tracking the risk and compliance status of all AI projects. Scan includes:

- a. Infosys Responsible AI Watchtower for continuous monitoring of external facing events, such as regulation and policy changes, threats, vulnerabilities, risks, industry best practices, and technology advancements in the field of Responsible AI.
- b. Infosys Responsible AI Maturity and Risk Assessments for gauging compliance readiness, discovering risks, analyzing gaps, and preparing roadmaps to scale Responsible AI in an enterprise.
- c. Infosys Responsible AI Audit to ensure compliance with existing standards and regulations.
- d. Infosys Responsible AI Control Center for internal telemetry and monitoring of compliance status of AI systems; sense and predict violations ahead of time, alert the right stakeholders, and stage interventions.
- e. Regulation Readiness Consulting to be future-ready for upcoming regulations and third-party risks.

SHIELD

We offer our clients technical and specialized solutions, guardrails, and accelerators for protecting AI models from vulnerabilities. Our suite of offerings bundled under the name 'Shield' helps embed 'Responsible by Design' across the AI lifecycle. Shield includes:

Infosys Generative AI Guard Rails detects and mitigates anomalies corresponding to Responsible AI tenets and vulnerabilities in both the prompt and the output and acts as a sentient moderation layer to ensure safe and responsible use of Generative AI.

Infosys AI Model Security provides enterprise AI security solutions that detect different adversarial attacks on models like poisoning attacks, evasion attacks, inference attacks, injection, and more, and respond to them in real-time, reducing the threat surface of organizations.

Infosys Responsible AI Toolkit is a collection of specially designed Responsible AI pipelines and API endpoints that can be integrated for enforcing 'Responsible AI by design' principles into the AI lifecycle. This toolkit automates the tedious tasks of ensuring compliance, thus enabling data scientists and developers to focus on innovation.

Infosys Responsible AI Gateway brings together our domain expertise to redesign AI-powered mission-critical business workflows to reduce the propagation of AI risks downstream. It involves

restructuring the business workflow to safeguard against AI failures by introducing safety aspects such as humans in the loop or generation of alerts.

STEER

We offer our clients advisory and consulting services to enable them to advance their RAI journey and become leaders in the space. We assist them in setting up, governing, and managing a dedicated Responsible AI practice. Our offerings called ‘Steer’ aid clients in formulating their strategy and achieving exceptional results via standardized audits and industry certifications. Steer includes:

Responsible AI Practice Setup develops end-to-end RAI practice and adoption across the organization with a mix of frameworks and advisory services. We assist in developing customized best practices, playbooks, capabilities, and policies to implement strong AI governance across the board.

Responsible AI Strategic Advisory Services address AI governance challenges. Our responsible AI consultants create the mechanisms and escalation paths that provide oversight for an RAI program and formulate an overall strategy.

AI Crisis Management helps in designing crisis management protocols and developing proper disaster recovery mechanisms to engage in swift remediation in the event of an unforeseen AI-related crisis.

VALUE FOR ENTERPRISES

Robust automated model governance process and controls for audits, monitoring, and telemetry

Standardized and automated model life cycle management

Responsible metrics-driven decision-making in model development and post-deployment monitoring

End-to-end service offering by understanding current process maturity, implementing third-party platforms/deploying custom solutions, validating models for risks and standardizing processes

Backed by expert consultants who are well versed with regulation, industry, technology, and product trends and have experience in setting up AI COE

Leverage global partner alliances for bringing industry best practices and solutions as part of the implementation lifecycle

Accelerate responsible innovation by leveraging prebuilt accelerator kits

Fast track time to value for building custom responsible AI solutions using industry and function-specific use cases

Technology-agnostic custom solution development to address different facets of Responsible AI

Practical implementation knowledge based on experience of deploying hundreds of models in production for global clients



Challenges & Solutions

[Automating and simplifying complex bureaucratic processes and oversight mechanisms](#)

While enforcing Responsible AI, organizations tend to throttle innovation and progress with several manual checks and balances. Our automated technical and policy guardrails ensure that these checks and balances are embedded and enforced as per guidelines seamlessly across the AI lifecycle without the need for major human interventions. These solutions will manually scan your AI systems for any violations, irregularities, and risks and automatically mitigate the majority of the risks or alert human agents. Our offerings and services help transition management to responsible AI by reducing friction and embracing and internalizing RAI principles.

[Technological constraints](#)

Different technical guardrails might not always be available per the customized AI use-cases, models, data types, and RAI principles. Our offerings offer comprehensive protection for all data types like text, structured data, images, speech, and audio and for all types of AI models, and different use-cases and purposes like detecting bias and enforcing fairness, improving transparency, protecting from security and privacy violations.

[Customization and scalability](#)

Tailoring RAI guidelines to suit the enterprise's unique needs and complexity, while maintaining consistency and compliance can be daunting. Our offerings are highly customizable and scalable per different industries and business functions.

[Continuous monitoring and enforcement](#)

Continuously monitoring AI applications to ensure compliance with RAI guidelines and enforcing adherence throughout the AI lifecycle can be resource-intensive and complex. AI models and use cases are dynamic and ever-changing. Adapting to evolving regulatory requirements that may change over time necessitates agility and the ability to modify strategies and implementations accordingly. Harmonizing enterprise RAI guidelines with global standards and ensuring consistent adherence across different regions and jurisdictions can be a complex task due to varying regulatory landscapes. Our Infosys offerings continuously monitor the techno-legal landscape for recent threats, vulnerabilities, risks, and policy changes and accordingly adapt the guardrails.

[27. Samsung Group Digital Responsibility](#)

AI Ethics Principles

AI is a rapidly developing area and its global social, economic impact is also growing. While recognizing that technologies promote innovation, the same technologies raise important challenges to be addressed. Samsung SDS acknowledges the use of AI technologies should aspire to human dignity and human rights as well as to a sustainable environmental ecosystem. Therefore, Samsung SDS will establish corporate AI ethics principles based on UNESCO's recommendations for the ethics of artificial intelligence. We believe all use of AI technologies must respect the rule of law, human rights, and values of equity, privacy, and fairness. These principles set out our commitment to develop, deploy, and use technology responsibly.

1. Respect for Human Rights

Based on the Samsung Spirit, our top priority is to benefit humanity and society. We respect and comply with international human rights laws and values in general and also in relation to AI technologies. Further, we will work to limit any potentially harmful or abusive application that can negatively affect human beings and their rights as we develop and deploy AI technologies.

2. Diversity and Inclusion

We believe that everyone should be treated fairly and equitably. We understand that defining fairness is not always simple and differs across cultures and societies. We will seek to avoid biased results and unjust impact on sensitive characteristics such as race, ethnicity, gender, nationality, income, sexual orientation, ability, and political or religious belief. We also will seek to avoid exposing children to inappropriate content.

3. Data and Privacy Protection

We recognize the importance of protecting the privacy and security of people's data. To minimize privacy risks, we will continue to monitor data processing processes and develop safe and secure practices.

4. Conservation of Environmental Ecosystem

We will comply with relevant national and international regulations, standards and practices to assure that AI development and services do not adversely affect the sustainability of the environment and ecosystem.

5. Communication

We believe in transparency and explainability. AI will be explainable for users to understand its decisions or recommendations to the extent technologically feasible and that this does not jeopardize corporate competitiveness. Samsung SDS will also devise countermeasures against the risks and negative consequences that AI technology can cause to the users.

28. [Sea Limited – Digital Transformation Strategies](#)

Sea Digital Transformation Strategies Report Overview

Sea Ltd (Sea) is tapping into AI, big data, mobile, cloud and ecommerce among other disruptive technologies to enhance its operational and service capabilities. The annual ICT spending of Sea was estimated at \$1.2 billion for 2023. A major share of this spending is earmarked for acquiring software, ICT services, and network and communications from vendors. Sea carries out the development of platforms for online, mobile entertainment, and communication for users. Its Garena platform is an online games developer and publisher with global footprint across more than 130 markets, enables users to access mobile and online PC games, and other entertainment content such as live streaming. The company operates an ecommerce platform called Shopee that connects buyers and sellers. It offers SeaMoney, a digital payments and financial services provider and provides various digital financial services such as ewallet services, payment processing, credit-

related digital financial offerings, and other financial products to individuals and businesses. The company operates in Singapore, China, Indonesia, Malaysia, Philippines, Taiwan, and Vietnam.

The Sea Digital Transformation Strategies report will act as a reference point to understand a company/competitor's digital strategy. It will also help in understanding the digital preparedness of the company against its peers. Information included in these reports are sourced from a mix of our very own internal database and authentic secondary research links such as company's annual report, presentations, press releases etc. The report covers overview of the company, its digital transformation strategies, technology focus areas, technology initiatives, investments, acquisitions and ICT spending among others.

Digital Transformation Strategies

Sea stores and process large volumes of data related to gameplay, ecommerce, and payment processing. Its proprietary data analysis engine collates and structures data to generate valuable insights on user needs, preferences, and behaviors that help to enhance services, user experience, effectiveness of cross-promotions, and discover opportunities.

To gain more insights on digital transformation strategies and initiatives of Sea

Sea Technology Theme Focus

Sea is tapping into AI, big data, cloud, mobile and ecommerce among other disruptive technologies to enhance its operational and service capabilities.

Sea Technology Initiatives

Sea has been involved in several strategic technology partnerships and collaborations, and technology developments and roll outs over the past few years.

For instance, in 2020, Sea selected Weyland Tech to enter the food delivery market in Jakarta. Under this collaboration Weyland's AtozGo food and grocery delivery service will be integrated with ShopeePay, allowing users to transact AtozGo orders within ShopeePay mobile app. This collaboration also allows AtozGo mobile app users to pay for their deliveries using ShopeePay's payment technology.

Buy full report for more insights on other technology initiatives of Sea

Sea Resources ICT Spend by Function

Data center

Communications

Network

Applications

End-user computing

Management

ICT Service desk

Sea ICT Spend by Channel

Internal development and maintenance

Technology vendors (direct)

Local resellers

Telcos

ICT services providers/consulting firms

Specialist outsourcers

Systems integrators

Sea ICT Spend by Segment

Software (including Cloud SaaS)

Hardware (including Cloud IaaS)

ICT services

Consulting

Network and communications

Others

Scope

This report provides:

Insight into Sea's technology activities.

Insights of its innovation programs.

Overview of technology initiatives covering partnerships and technology introductions.

Insights on each technology initiative including technology theme, objective, and benefits.

Details of estimated ICT budgets.

Reasons to Buy

Gain insights into Sea's technology operations.

Gain insights into its technology strategies and innovation initiatives.

Gain insights into its technology themes under focus.

Gain insights into its various partnerships.

Sample Report

Sea Limited – Digital Transformation Strategies was curated by the best experts in the industry and we are confident about its unique quality. However, we want you to make the most beneficial decision for your business, so we offer free sample pages to help you:

Assess the relevance of the report

Evaluate the quality of the report

Justify the cost

Download your copy of the sample report and make an informed decision about whether the full report will provide you with the insights and information you need.

29. [Grab's AI Ethics Principles](#)

Since our inception in 2012, Grab's mission has been to drive Southeast Asia forward by creating economic empowerment for everyone. We believe that the use of AI technologies can help us make rapid progress on our mission and solve Southeast Asia's most complex problems. Grab [uses AI](#) to build a safe and trusted digital platform, solve real-world problems, and empower Southeast Asia's micro-entrepreneurs to grow and thrive. We also recognise that AI needs to be developed and deployed responsibly to mitigate risk and potential for harm. Our AI ethics principles guide our efforts to this end. We will continue to deliberate on and evolve these principles to keep pace with the rapid developments in AI technologies, their impact, and associated tradeoffs.

1. Promote benefits to society: As we design AI-based solutions for our users, we aim to take into account the social and economic needs of individual users as well as society at large with the goal of ensuring that the final product is beneficial to all. Grab's values of heart, hunger, honour, and humility are used as guiding principles in the system design process with the goal of ensuring that each stakeholder's needs are taken into consideration.

2. Fairness and Inclusion: We work hard to ensure that outcomes generated by AI systems are fair and promote inclusion. While different people may understand fairness differently, we strive to ensure that AI-generated outcomes do not disadvantage or harm any stakeholder groups. However, because our ecosystem is composed of various stakeholders such as driver and merchant partners, consumers and the platform, at times we may require balancing individual tradeoffs with the goal to improve the overall efficiency and performance of the ecosystem. Grab will also continue to seek to understand the social, cultural, and other context-specific nuances in Southeast Asian markets in order to create hyper local solutions that limit any unintended discriminatory impact. We will continue to experiment with technical and non-technical solutions to mitigate the risk of bias in AI models and datasets.

3. Transparency: We believe that it is important for our users to understand the process through which the decisions that impact their day to day lives are made. We will strive to provide better clarity on how our algorithms work and the factors that inform them. This transparency will also help us mitigate unfairness concerns in AI outcomes, build customer and partner trust, and continually enhance the design and performance of our AI systems based on feedback from consumers.

4. Safety and reliability: It is of utmost importance to us that our AI systems function safely, reliably, and adhere to the highest performance standards to minimise any unintended outcomes. We will continue to use AI and enhance its performance to develop more rigorous safety practices for our driver-partners, merchant-partners, and consumers, including use cases like fraud detection.

5. Human-centricity: We aim to continually understand and accommodate the evolving needs of our consumers, driver-partners, and merchant-partners in the design and deployment of AI systems. The context in which users experience these systems and the feedback they provide ultimately govern how we design and improve AI systems to provide the most optimal user experience.

6. Accountability: We employ a detailed system of checks and balances to ensure that AI systems are functioning reliably and outcomes are consistent with the intention, design ideas, and values behind them. We will also seek to provide adequate opportunity for human intervention and control where necessary. To enable user access to quick and efficient complaint redressal, we have put appropriate appeals and feedback mechanisms in place and will continue to improve them as needed.

7. Privacy and Security: We will continue to incorporate appropriate privacy and data security features in the development and use of AI systems. This process will not only involve adherence to how Grab commits to process users' personal data (see [Privacy Notice](#)) and applicable data protection laws, but also include improvements in our security features to ensure that our systems, including those driven by AI, operate in a secure environment to safeguard entrusted data and company assets.

30. [Sea Founder Warns of Turmoil From the Shift to AI](#)

[Sea Ltd.](#) founder Forrest Li warned of a difficult transition to AI in coming years, but stopped short of outlining the Southeast Asian e-commerce leader's plans for developing artificial intelligence tools.

Li talked about the transformative technology, comparing it to the PC and mobile revolution the industry has navigated. Now AI could be a bigger challenge than those, the 45-year-old founder said in a staff memo released on the 15th anniversary of Sea's founding. But he emphasized that the company was in a better position financially than in the previous decade.

"The AI wave has not quite arrived, but we can see it approaching," he wrote. "This technology transition may be harder on us than the last one. Back then, being a newcomer to e-commerce and mobile games freed us to fully focus on the new platform from the start. This time, we are the ones who will have to adapt to a new technology."

Li, who is fond of penning memos to Sea's 60,000-plus employees, didn't directly address some of his company's more immediate challenges.

The owner of the Shopee shopping app faces intensifying competition in a Southeast Asian market of more than 650 million people. [ByteDance Ltd.](#)'s TikTok, [Alibaba Group Holding](#)

[Ltd.](#)'s [Lazada](#) and newer entrants like Temu and Shein are vying for the shoppers that are moving online in countries such as Indonesia and Thailand.

Read More: [Sea, Grab Face Slowest Southeast Asia Online Growth in Years](#)

Yet Sea has had some success improving its profitability, helped by cost cuts. The company [said](#) in March it expects to earn its second straight annual profit this year. Its shares have advanced 61% this year and are nearing their highest in 12 months. Yet they remain far below historic levels.

To cope with the rising competition, Li said in August he intends to increase investments into Shopee. Besides AI, he's stepped up efforts to build out its live-streaming arm, an offensive move that could erode margins and trigger a price war with TikTok and Alibaba.

31. [Atos blueprint for generative AI](#)

AI is a broad topic encompassing many different families of algorithms and techniques. However, we currently live in a narrow AI era where AI is used for very specific tasks. Some AI techniques such as machine learning have proven to be more efficient than humans in areas such as computer vision, automated translation, predictions and anomaly detection.

Despite the progress, a number of technical challenges remain. There is a huge need for diverse and qualitative data and — in some cases — large volumes of historical data. Furthermore, we need more efficient computing, algorithms and DevOps scalability (e.g. parallelization for algorithms and MLOps tooling for DevOps).

Bringing the best out of AI

Atos defines responsible AI with four key dimensions: fair and ethical, robust and secure, industrialized and eco-sustainable. Atos enables you to boost your business by keeping these foundational elements of responsible AI in mind.

The proposed way in which Atos can boost your business are:

Enable AI – design and deliver cost-efficient and secured infrastructure for your AI needs

Augment with AI – leverage AI to optimize existing business processes and operations

Grow the business with AI – leverage AI to create new business models

The four horsemen of the apocalyptic AI

A failure to follow the four dimensions of responsible AI can have a serious business impact. Below are some of the problems and consequences of (non)responsible AI:

(Un)fair and (un)ethical — Compliance fines, reputation damage, reduced talent attraction, negative corporate social responsibility impacts
(Non)robust and (un)secure — Reputation risk, user acceptability, revenue impacts, compliance fines

(Non)industrialized — Impact on gross margin, lower revenue, productization and scalability challenges

(Non)sustainable — Ambiguous decarbonization goals, reputation damage, higher cost for customers, reduced talent attraction, lower revenue, compliance fines

Ethical considerations are important in AI solutions. There has been a shift from algorithms written by humans to algorithms that learn their behaviour from data. This implies that humans need to be in the loop to control outputs of the AI algorithms, which can be biased by input data or potentially compromised. Full delegation of human-controlled tasks to AI solutions implies greater responsibility in the way AI solutions are designed and maintained in a secure and explainable way.

Putting customer's purposes at the heart

Finally, it's important to position AI ethics within a customer relationship. Ethics is relative to every purpose and company. Our goal is to support our customers in building responsible AI. We do this by first defining Atos ethics, which explain how we want to drive our AI projects from an ethical point of view. In addition, they must be aligned with the Atos's enterprise purpose. Then, we define the AI ethics specificity driven by a particular project that requires a custom view on the situation (e.g. a self-driving car that needs to adapt to the principles and cultures of a particular country).

We establish processes and provide rules and tools to make sure that AI solutions take ethical concerns into account up-front, from their creation to their retirement. In a nutshell, we advise our clients to include AI concerns in their ethics.

Only by taking this broad array of factors into account and designing solutions that align with our priorities, client priorities and the specific business, cultural and legal parameters can we develop AI solutions that are a true win-win for all parties.

[32. AI code of ethics](#)

Our Code of Ethics for AI is a general-purpose technology that can affect entire economies, and which is spreading very visibly beyond the business area to areas of daily life. A challenge facing both business and society today is how to optimize the opportunities offered by AI technology, whilst addressing the risks and fears that AI may generate. Since its foundation, Capgemini places ethics at the center of its activity. As a leader in digital transformation, we are committed to the adoption of AI in a way that delivers clear benefits from AI technologies within a trusted framework, by building a Code of Ethics for AI. Our ethical culture drives our vision of AI, guided notably by 5 of our core Values: Honesty, Trust, Boldness, Freedom, and Modesty. These Values work together to inform our approach. Boldness drives us to act as entrepreneurs, identifying and pursuing the opportunities presented by innovation in this field. We aspire to increase Freedom by empowering, complementing and augmenting human cognitive, social and cultural skills, giving people more say over how they live their lives. Modesty keeps us mindful of the need to mitigate risks, building solutions that are robust, safe, and human-centric. Honesty underpins our commitment to transparency, and to creating solutions that are accountable and controllable. We consider Trust to be an essential basis for long-standing interdependent relationships with clients, users, and all members of our ecosystem; the value we place on Trust drives our efforts to create AI that protects privacy and ensures equal access rights and fair

treatment. Our Code of Ethics for AI guides our organization on how to embed ethical thinking in our business. It is illustrated by concrete examples from projects or solutions that we deliver. Reference to its principles stimulates ethical reasoning and is intended to launch an open-ended process of discussion within the company, with our clients, and with all stakeholders. Our Code of Ethics for AI concerns both the intended purpose of the AI solution, and the way we embed ethical principles in the design and delivery of AI solutions and services to our clients. It should be read in combination with applicable legislations with which Capgemini is, of course, committed to comply. At Capgemini, we believe that human ethical values should never be undermined by the uses made of AI by business. We want AI solutions to be human-centric, which we define as follows: 1. AI with carefully delimited impact – designed for human benefit, with a clearly defined purpose setting out what the solution will deliver, to whom. 2. Sustainable AI – developed mindful of each stakeholder, to benefit the environment and all present and future members of our ecosystem, human and non-human alike, and to address pressing challenges such as climate change, CO₂ reduction, health improvement, and sustainable food production. 3 Fair AI – produced by diverse teams using sound data for unbiased outcomes and the inclusion of all individuals and population groups. 4. Transparent and explainable AI – with outcomes that can be understood, traced and audited, as appropriate. 5. Controllable AI with clear accountability – enabling humans to make more informed choices and keep the last say. 6. Robust and safe AI – including fallback plans where needed. 7. AI respectful of privacy and data protection – considering data privacy and security from the design phase, for data usage that is secure, and legally compliant with privacy regulations.

1. AI with carefully delimited impact ETHICAL CHALLENGE The very first and fundamental ethical question to be considered is the intended purpose of the AI solution and its impact on humans. Like any general-purpose technology, AI solutions can equally enable and negatively affect human fundamental rights. **CAPGEMINI’S RESPONSE** Capgemini cares about the intended purpose of AI solutions; our solutions must be mindful of the impact on humans and respect universal fundamental rights, principles and values, in particular the Universal Declaration of Human Rights and the UN Global Compact. AI must focus on improving life for humans and should neither exacerbate existing harm nor create new harm for individuals. The intended purpose of an AI application – what the AI solution will deliver, for whom, and to whom – must be clearly defined, and AI should be used according to its intended purpose. To this end, we are transparent about the intended purpose with our various stakeholders, notably the end users, and include appropriate provisions in our agreements, clearly describing the use for which the technology is intended. As AI is a highly evolutive technology, we believe that assessing the impact of AI solutions, notably on individuals, is important to help identify the overall impact, i.e. the likely benefits against the foreseeable risks, such as social impact or potential risk deriving from inadequate or inappropriate use. Assessing the potential impact that a new technology can have before adopting it helps identify undesired side-effects and consequent ethical risks and helps mitigate them. In situations where there is any doubt about a potential risk of affecting fundamental rights, a fundamental-rights impact assessment will be undertaken to ensure that such a risk is eliminated.

2. Sustainable AI ETHICAL CHALLENGE Beyond the direct impact on humans and human society, other beings and the environment can be impacted by AI solutions. The challenge goes beyond guiding “human-friendly AI”, to ensuring “Earth-friendly AI”. As the scale and urgency of the economic and health impacts from our deteriorating natural environment grows, we have an opportunity to look at how AI can help transform traditional sectors and systems to address climate change, deliver food and water security, build sustainable cities, and protect biodiversity and human wellbeing. Furthermore, AI cannot support a sustainable future if it is not itself

sustainable by design. CAPGEMINI'S RESPONSE AI systems should benefit all human beings. This means that their design and development should take into careful consideration the social and societal impacts. Design and development must also be mindful of future generations, the environment, and all beings – human and nonhuman alike – that make up our ecosystem. They must be considered as stakeholders throughout the AI solution's life cycle, so that AI solutions are sustainable and environmentally friendly. We support AI to address challenges in societal areas as diverse as climate change and CO₂ reduction, digital literacy and inclusion, environmental protection, health improvement, and sustainable food production.

3. Fair AI ETHICAL CHALLENGE

In order to be effective, AI needs to learn from historical data. The more data, the more accurate an AI system will be in terms of categorizing, predicting, prescribing, and overall decisioning. However, training data for machines, notably statistics, may reflect an organizational or individual perspective on a given subject matter, or a historical picture of reality. This perspective may be biased or incorrect, as data can include various forms of bias, resulting in extrapolations that can conflict with or undermine current trends and desired evolutions, gradually building up over time. This can result in discrimination against certain population groups based on gender, ethnicity, or similar social factors. Likewise, unfair biases and discrimination can be built in the algorithms themselves, by design and development teams lacking appropriate diversity.

CAPGEMINI'S RESPONSE

We embed diversity and inclusion principles throughout the entire AI system's life cycle:

- AI design and development teams must be built as diverse teams, with diversity in terms such as gender and ethnicity, but also discipline, for multiple perspectives during AI design, and sensitivity to the fullest spectrum of ethical issues.
- We seek to identify any unfair bias likely to lead to discrimination and inappropriate results in the context of decision making, and present possible correction scenarios to remove them.
- We will advise clients to put in place an oversight process to analyze and address the system's purpose, constraints, requirements, and decisions in a clear and transparent manner.
- AI systems must entail and ensure equal access rights and treatment by people (regardless of ethnicity, disability, age, religious belief, sexual orientation, or other personal characteristics).
- As an alternative to – potentially biased – historical training data, generated (i.e. synthetic) data or off-the-shelf industry data should be considered.

4. Transparent and explainable AI ETHICAL CHALLENGE

The complexity of AI may amplify the “black box” concern. A “black box” is a device, system, or program that allows input and output to be seen but gives no view of the processes or workings between the two. For example, in tools using artificial neural networks, hidden layers of nodes process the input and pass their output to subsequent layers of nodes, while in deep learning, an artificial neural network “learns” autonomously by pattern recognition. As with a human brain, one cannot see the output between layers, how data has been analyzed, or what has been “learnt” – one sees only the conclusion. Where a conclusion needs to be checked and justified, because it is unexpected, incorrect, or problematic, it can therefore be highly challenging to understand. This is of greater concern where AI functionality plays a role in high-stakes decision-making areas, such as banking, justice or health, where the potential impact of decisions is more serious.

CAPGEMINI'S RESPONSE

AI must be transparent: its capabilities and purpose should be openly communicated. Decisions based on AI solutions should be explainable, with the degree of explicability dependent on the context and severity of the consequences if the output is erroneous. The data sets and processes used for the AI solution should also be documented to allow for traceability and, if required, for auditability. When interacting with an AI interface, individuals should be aware that they are communicating with a machine, and should not be misled into thinking otherwise, while being informed of the AI capabilities and limits. Individuals interacting

with AI should be made clearly aware about the purposes of the AI system, how it works, with whom the information may be shared, the impact of the AI solution and any potential impact on their rights, if any, in relation to the AI system at stake. We will advise our clients to ensure with us that systems developed are explainable, especially regarding data selection and treatment, notably weightings. We will endeavor to indicate the limits that can exist in the understanding of their functioning. Working with technologies that we understand and control, we will provide documentation and training to users to explain the logic behind the functioning of the AI and to indicate the limits of understanding and testing scenarios, in a manner adapted to the different stakeholders potentially concerned.

5. Controllable AI with clear accountability

ETHICAL CHALLENGE While the control responsibilities in any IT system depend on organizing accountability, several aspects complexify this with regard to AI. The production environment itself often involves many discrete contributors, including highly specialized third parties, rendering in-built controllability and oversight more difficult. Moreover, in a legal environment largely based on the assumption of human agents, AI systems depend to a greater or lesser degree on AI-driven intelligence, autonomous agents, and autonomous decisionmaking. Determining responsibility for AI outcomes is further complexified by techniques such as deep learning, which can make systems hard to control and outputs difficult to explain. While individuals need to know who will be answerable in case of malfunction, or should a system have unintended consequences or cause harm, tying an AI's actions or decisions to a human, or group of humans, can therefore present a considerable challenge.

CAPGEMINI'S RESPONSE Humans should keep the last say on AI, and we should design AI solutions in such a way that AI cannot learn to circumvent the controls and voluntary interruptions by humans. The design of AI solutions should protect the human's autonomy and decision making. As such, AI solutions should help humans make more informed choices. To ensure such respect, humans should be part of the AI governance mechanism in such a way that they always keep control over AI. Appropriate measures should be implemented from the AI solution's design phase, with the appropriate level of human oversight depending on the AI solution application area and potential risks. AI systems cannot be the subject "per se" of legal responsibility for their own functioning, so the AI system design should embed accountability rules (to identify who is responsible for what) and trackability principles, allowing the AI-based decisionmaking process to be explained and audited, thus helping to identify and prevent future mistakes or bias. To achieve this objective, we will advise our clients that it implies to define and clearly identify together roles and responsibilities amongst the different actors involved in the design, manufacturing, integration, deployment and operation chain, including the designer of the AI solution, the data provider, and the company that adopts the AI solution or the final user. This would enable appropriate allocation of liability and effective recourse when needed.

6. Robust and safe AI

ETHICAL CHALLENGE Like any tools or systems, those utilizing AI must be fit for their intended purposes, and resilient and secure from a technical perspective. As AI uptake increases, so does the scope for potential impact, and the need to also consider the broader social and environmental context in which AI-based tools and systems operate. From this arises the challenge to foresee measures to safeguard against any risks, such as unlikely mishaps or malevolent intent, that might prevent the AI from delivering the desired benefits.

CAPGEMINI'S RESPONSE Robustness should be embedded throughout the life cycle of the AI systems, from the design and development to the deployment and use over their lifetime. AI systems should include, when achievable, fallback plans in case of failure of the AI system itself (e.g. allowing to adjust rule-based logic or even switch to human control, to avoid any wrong output), as well as being accurate, reliable and having reproducible results,

to the extent allowed by applicable laws. 7. AI respectful of privacy and data protection ETHICAL CHALLENGE With AI taking off, the need for data is greater than ever, much of it driven by consumers. The opportunity for greater freedom presented by easily accessible data brings with it a related risk to data protection and informational privacy. Lengthy user agreements can tempt consumers to click “accept” without checking what rights they are giving away, while companies can be tempted to feed consumer and vendor data into advanced, AI-fueled algorithms, without the awareness and approval of the affected consumers and employees. Facial recognition, voice identification systems and smart homeappliances collect data about when we come and go; while many such functions provide a helpful service, the potential risks they carry are not trivial: Seemingly anonymized data can be de-anonymized by AI. Data collected can also enable tracking, monitoring, people profiling, and behavior prediction. By raising analysis of personal information to new levels of power and speed, AI magnifies our ability to use – and misuse – personal information, presenting a challenge for privacy and data protection. CAPGEMINI’S RESPONSE In agreement with the client, we must ensure, that we will put in place all the necessary means for our current perimeter of responsibility, to contribute to the Clients’ global AI objectives in terms of compliance with privacy regulations, data protection and proper data governance. AI and data protection are compatible as long as data protection and cybersecurity are taken into account from the design phase of any AI project. Besides ensuring full respect for privacy and data protection laws and regulations, adequate data governance mechanisms should also be put in place. In practice, this means that any AI project would need to ensure that only data that are strictly necessary are collected and processed. Indeed, the data collected and used shall be proportionate, accurate, and processed in a secure manner. Individuals will be provided with the relevant level of information on how their data is processed and they should be provided with appropriate means to exercise their rights as may be required by law. CAPGEMINI’S RESPONSE In agreement with the client, we must ensure, that we will put in place all the necessary means for our current perimeter of responsibility, to contribute to the Clients’ global AI objectives in terms of compliance with privacy regulations, data protection and proper data governance. AI and data protection are compatible as long as data protection and cybersecurity are taken into account from the design phase of any AI project. Besides ensuring full respect for privacy and data protection laws and regulations, adequate data governance mechanisms should also be put in place. In practice, this means that any AI project would need to ensure that only data that are strictly necessary are collected and processed. Indeed, the data collected and used shall be proportionate, accurate, and processed in a secure manner. Individuals will be provided with the relevant level of information on how their data is processed and they should be provided with appropriate means to exercise their rights as may be required by law.

33. [AI based anti-tailgating Solution](#)

dormakaba presents technology innovation of an AI based anti-tailgating solution at BAU 2023

Interview with Marc Faresse: Marc is an expert in AI and Video Analytics within the Group Innovation Management Team at dormakaba. With his many years of experience, he gained within and outside the company, he is helping dormakaba to introduce AI-based technologies like face recognition into its offering.

What is tailgating and what challenges does it present? Tailgating, the passage of an unauthorized person behind authorized personnel, is one of the most common physical security breaches. Also known as tailgating often results from a random act of

kindness such as holding the door to a stranger. It can be seamless and a lot less suspicious to follow an authorized person rather than breaking into a building. Those with criminal intentions are well aware of this.

In high-traffic settings like large facilities, companies, or residential complexes, the risk of tailgating is higher. Tailgating can expose people and companies to perils like loss of revenue or goods, reputation, and even physical danger. Hence, it's not a surprise that tailgating is among the top three security concerns of Fortune 1000 companies.

How is it possible to mitigate the risks of tailgating? One of the most efficient ways of mitigating tailgating risks is to install appropriate access control systems and manage them methodically — a suitable solution as such is turnstiles. As the entrance control method of choice for bustling facilities, turnstiles allow only one person at a time, and only after the visitors present the appropriate entrance credentials.

Depending on the needs of a building, it's possible to operate the turnstiles either with or without the assistance of the front-desk or security staff.

Integration of video surveillance in key security spots on a building, and particularly the main entrance, not only deters criminals but also helps law enforcement authorities to identify the tailgaters in case of a crime.

Thanks to technological advancements in biometrics and machine learning, some modern video security systems can even differentiate between people passing in the foreground and tailgaters.

Wearable identification, such as badges, ensures that anyone who carries it is authorized to be in the building. This includes all permanent staff and visitors, as well as temporary workers.

While visitor badges are inexpensive and ubiquitous, other tools such as a QR code generated from a mobile app or biometric credentials can also help to prevent the risk of tailgating.

While appropriate measures such as turnstiles, credentials, or surveillance can reduce the risk of tailgating, security is a collective effort.

Has dormakaba offered an innovative concept? The idea is to cover all hiding areas and dead angles in airlock, room, corridors, or a gate with an AI system that could recognize a person and a part of body detection to determine if there is a tailgating situation in airlock or any space that has restricted access. In addition, this AI based system could recognize more objects and detects more situation like counting the number of people crossing the gate or counting the number of luggage passing by a self-boarding gate or a mom with her baby in a trolley, reacting according to each particular situation.

The innovation here is a supplement camera to count a lower body part in combination with a camera that could detect the person from the top.

What kind of anti-tailgating development is behind the concept of dormakaba?

The concept is based on AI. The camera sees and recognizes a person and other objects that could cross a gate or a door. Our patent application is currently being processed.

We are currently working on the proof of concept.

The camera only captures the lower part of the body to ensure privacy.

The sensors are small and compact, allowing for very short gates.

We will receive additional information about objects passing through the gates and respond accordingly, such as detecting a person in a wheelchair or a person with their dog.

This data can provide more detailed information for better decision-making.

Our goal is to improve safety and enhance the user experience and to avoid false alarms.

Using cameras and sensors to detect people as they move through a space. The AI algorithm can analyze the data from the cameras and sensors to understand the situation and react as needed, while dealing with data privacy concerns.

This involves training machine learning algorithms to recognize patterns and can be particularly useful in situations where there are limited sensors or cameras available, or where the environment is more challenging.

This is continuing the AI development we have done with existing sensors we have in the ARGUS gates launched in 2016.

Is there a product that will incorporate this innovation? At the BAU 2023 trade fair, we will present the new compact Argus V60 sensor gate. It offers safety, elegance, and efficiency in a very small space. Thanks to modern sensor technology, this compact sensor barrier, which has already won the German Design Award Special 2023, gives architects and users more freedom without compromising on personal protection and separation detection. Particularly in areas such as foyers with elevator systems or within office buildings.

34. [Trustworthy AI](#)

Trustworthy AI - What it means for telecom

Trust and reliance on modern telecom systems are widespread. However, the adoption of artificial intelligence (AI) introduces new risks and necessitates countermeasures. Governments, companies, and standards bodies worldwide are recognizing the need for trustworthy AI systems. The European Union AI Act and Ericsson's adherence to ethical guidelines demonstrate this commitment.

Introduction

Billions of people have come to trust and depend on modern telecom systems to support their needs and quality of life. As these systems adopt new technologies, it's important trust is maintained by understanding and addressing any new risks. Artificial intelligence (AI) differs from

traditional software in its construction and operation and may introduce new and varied risks, calling for new countermeasures and guardrails. For example, the large amount of data used for AI training raises the possibility of privacy risks. Development procedures must ensure that AI models learn what is intended. The model operation should be thoroughly understood, for example, using explainability techniques. In short, to maintain the trustworthiness of the overall system, AI must itself be trustworthy: meaning, it should operate as intended and do no harm physically or ethically.

Governments, companies, and standards bodies around the world are taking notice of these facts and creating requirements regarding the trustworthiness of AI systems. The upcoming European Union AI Act¹ is one such effort. It follows principles written by the European Commission High-Level Expert Group in their “Ethics Guidelines for Trustworthy AI”². Ericsson has adopted these guidelines. The framework breaks trustworthiness into seven specific areas. This paper explores how six of these areas apply to AI in telecom systems, some of which are depicted in Figure 1.

Human agency and oversight

Human agency and oversight requirements make sure that humans can always intervene in AI-controlled systems before things like fundamental rights and safety have the potential of being affected - in other words before they could pose any harm. Implementation of such requirements means having “humans in the loop”, the difficulty of which depends on the timescale of the decision and the criticality of the system.

Sometimes AI operates at timescales, which are much too fast for human intervention, such as the optimization of radio operations in a base station. In telecom, these uses typically do not have a direct impact on the rights and safety of individuals. However, they can dramatically impact network operations, which can subsequently affect humans, so they need careful assessment.

Implementing human agency and oversight in AI-aided network operations requires user research, product function design, and user testing to make sure that network operation engineers can detect and intervene when needed. The human-machine interaction design must be aligned with existing network operation processes, rely on existing interfaces, and provide actionable information to users.

The interface for human agency and oversight may vary depending on the use case and users. It can be a GUI, CLI, Rest-based API, or even a physical interface (for example, a light). For instance, an AI system that detects and predicts network-wide congestion may use a graphical interface embedded in a dashboard used for regular network design and operations. The system may also send alerts if AI performance deteriorates (for example, by reporting too many false network congestions) to the network operations center (NOC). The alerts should include everything the NOC engineer needs, including reasons for the problem, potential root causes, and solution suggestions. The engineer then has three choices: to switch to a non-AI based function; to understand and solve the AI issue; or to escalate it. Alert volume should be considered, to not overwhelm a potentially already heavily loaded NOC. Explainable AI methods can help in generating needed, and user-tailored, reasons for problem.

The use case, user knowledge, and persistence of the AI notification influence the actions to be taken. Intermittent or ephemeral events may need to be repeated. More serious events may need an escalation path.

Transparency

Trust can arise from understanding how a system works, or from experience using it over time. The complexity and black-box nature of AI can lead to suspicion, particularly when people feel that the AI's own creators don't fully understand how it makes decisions, and what exactly it has learned. Greater transparency can help build trust by understanding and explaining AI models to humans. Explainable AI (XAI) refers to methods and techniques that produce models which show why and how an AI algorithm has made a certain decision. It helps stakeholders understand how decisions are being made in different formats: by identifying what input factors were most important in making an inference and by providing explanations and responding to "why" and/or "what-if" questions. It also helps a human operator in decision-making. If the operator is not satisfied with a response, a further investigation can be performed, using computational argumentation techniques.

Creators of AI for telecom should provide XAI methods to help build the trust of their direct customers (for example, service providers), and in turn, enable them to build trust for their subscribers. The explainability of AI should start with design and continue through implementation, as a built-in feature, to ensure transparency throughout the AI development lifecycle. In addition, different XAI techniques should be researched, and developed to explain different types of machine learning (ML) methods.

The Ericsson white paper³ presents different XAI techniques applied to different AI/ML methods, including machine reasoning (MR), and reinforcement learning (RL). The explanations generated by these XAI techniques not only help explain the decisions to humans but also support automation, for example, in root cause analysis when combined with other AI techniques.

Explainability of ML, that is, feature analysis techniques (including SHAP and LIME) can be used in multiple telecom use cases to identify and explain the problems and root causes of specific ML model outputs in addition to ensuring the overall correctness of the ML models. These techniques can be applied to ML-based predictions to investigate the most important features that contribute to certain prediction results and validate the correctness of the ML model. The results of these explainability techniques can support MR components in identifying the root cause of the problem. 5G slice assurance is one such use case where these techniques are thoroughly investigated and tested. In this use case, certain Quality-of-Service (QoS) requirements (such as throughput, latency, and availability) are agreed upon with the customer in a service level agreement (SLA) and must be met throughout the lifecycle of the slice. ML models are used to proactively identify any potential violation of the agreed QoS requirements. Upon a violation in prediction, explainability techniques are applied to identify the most contributing features which in turn helps NOC Engineers in identifying the root cause of the problem⁴. These techniques can be applied to multiple use cases in a similar manner, like cell shaping and key performance indicator (KPI) degradation prediction, focusing on latency- and network throughput-related optimizations.

Explainability of RL: RL is suitable to solve many cellular network problems due to its dynamic nature, online training, interaction with the environment, and outstanding performance over traditional rule-based techniques for the telecom domain. An RL agent performs an action (such as applying a policy) in an environment to maximize rewards. The explainability of RL includes methods applied to different RL components, such as rewards and policy explanations.

In a base station, the antennas are tilted up, down, or kept the same to optimize KPIs, that is, the coverage of the network, increased quality by reducing interference, and capacity/ throughput of the network. Coverage refers to the area from which a UE can access the cellular network, while capacity refers to the amount of traffic the cellular network can handle simultaneously. Remote electrical tilt (RET) refers to adjusting the tilt of the antenna by an RL agent to optimize the above mentioned KPIs. Increasing the down-tilt reduces the area covered by the antenna, with the risk of leaving a certain area without coverage but increases the capacity in the covered area due to a stronger signal. In contrast, up-tilt results in a larger area covered but lower capacity due to a weaker signal. Explainability is important in the RET optimization of antennas in a cellular network. Explanations help in understanding the reasons behind a specific adjustment. The following explainable reinforcement learning (XRL) methods are applied to this use case⁵:

Reward decomposition provides intuitive contrastive local explanations for the agent's decisions by decomposing the reward into multiple sub-functions to adjust the tilt (see Figures 2 and 3), while achieving the same performance as the original DQN. The generated contrastive explanations are very user-interpretable, as they concisely answer questions in the form of "why did you decide to down-tilt instead of up-tilting?"

The Linear Model U-Tree (LMUT) reaches high performance while employing a fully transparent linear model capable of generating both local and global explanations (see Figure 4), however, it is less transparent than reward decomposition.

Autonomous Policy Explanation summarizes the trained policy and explains it in natural language, thus enabling the policy to be understood by everyone including non-experts.

Contrastive explanation through embedded self-prediction produces a local explanation about the internal representation of the RL agents (intermediate or inner layers of the deep neural network). It compares two different actions, such as why the antenna is tilted down and not up.

In addition to enabling transparency and AI automation, Ericsson has seen the potential of reducing the input feature set by using XRL. A novel method was developed for connecting explanations from both the input (feature analysis) and output (reward) ends of a black-box RL model, resulting in fine-grained explanations⁶. Reward prioritization, performed by the user, generates two different levels of explanation, and allows RL agent reconfigurations when unwanted behaviors are observed. Privacy and data governance

It is usually necessary or desirable to prevent AI systems' data from being disclosed. If the data includes the personal data of individuals, it may be subject to stringent legal requirements. Business data might contain intellectual property or be subject to contractual constraints. Sometimes, the data or other information related to it can be inferred from an AI model, especially when combined with publicly available data sources. Laws and regulations requiring privacy for individuals, such as the EU General Data Protection Regulation (GDPR)¹³, predate the mass adoption of AI across industries. Despite being written in a manner to make them future-proof, such regulations don't necessarily anticipate the extent of potential AI risks. There are also often contractual requirements for privacy. And even in the absence of such requirements, it is generally understood that maintaining privacy is ethically the right thing to do.

Ensuring privacy in telecom AI impacts the entire AI lifecycle and requires the application of Privacy by Design and Privacy by Default (as defined by GDPR⁷ and other global privacy laws),

starting with controls where the training data is collected and continuing through model use (inference). Many controls relevant to AI are the same as or similar to those used in other types of data processing. The nature of the data, the purpose of the collection, who will use it, and how and when it will be used, should be clearly communicated. Only the minimum amount of data required for the intended purpose should be collected. Unnecessary fields should be redacted or masked. Controls like pseudonymization, encryption, authentication, and authorization should be used to ensure appropriate access. Uses of the data should be logged and auditable. Once no longer needed, data should be securely erased.

Since AI models learn from the training data, in some sense the data is encompassed within the model. Therefore, it's unsurprising that attacks exist on models to extract the training data itself or make inferences about it. Privacy enhancing technologies (PETs), including differential privacy, exist to help make AI models less susceptible to such attacks.

Developers can also analyze model sensitivity to data extraction, for example, how many queries are required. Such metrics can inform decisions about the privacy risk involved in deploying the model.

Data can be exposed during training if it is improperly secured. When federated learning is used, multiple participants with independent datasets can contribute to building a single global model. This helps them keep their datasets private, but the protocols used must be carefully designed to ensure no information is leaked.

Diversity, non-discrimination and fairness

Bias in models can come from bias in the training data, which itself may stem from historical prejudices and inequities. It may also be caused by disproportional representation. One example is natural language processing systems used for interaction with subscribers, such as chatbots, or support ticketing systems. Even within a single language, training such systems should consider different speaking styles, idioms, and education levels. Not everyone speaks perfectly, but everyone deserves the same level of service.

Steps to avoid bias include:

understanding what categories exist in the input data that need to be treated equally

making sure each category is adequately represented in the training set, regardless of size

being aware of historical inequities that might be relevant to the problem at hand and adjusting the data accordingly

ensuring model robustness, including thorough testing

considering categories separately throughout the model development process, so that the model performs well for each

Even a seemingly solely technical problem can have a bias that impacts people, sometimes in subtle ways. Consider the use of AI to structure and operate mobile networks. This can be impacted (or biased) based on how and where that data is collected, or by cognitive bias already present in the system's creators. If data collection is skewed toward a particular group (for example, people with a certain economic status, which might correlate to other factors such as race), the resulting

system might be inadvertently biased. Telecom systems have to work everywhere in the world and should provide equally good service to all people.

If more investment (that is, equipment, optimization, effort) goes into certain areas, some of these areas might get disproportionately better service. Such areas could have different usage patterns. When ML that is used to plan, deploy, optimize, and operate networks is trained on data collected in some regions, networks (or products) might be created that work well only in those regions.

Technical robustness and safety

Human safety is not typically directly impacted by telecom operations but can be affected by situations like loss of service. Telecom systems can be important components in emergency communications and disaster handling. Another example is an application like autonomous vehicles, where the loss of communication might impact the ability to proceed safely.

AI can assist in these situations when it makes the network itself more robust. But this means that the AI itself must be robust. Careful attention to AI quality must be taken during training and deployment. Fallback mechanisms should be in place for cases where the AI cannot decide or makes an out-of-bounds decision to, for example, transfer the control to a human operator.

AI is also subject to new types of attacks. Data extraction attacks, which have already been mentioned, compromise the training data and potential privacy. Researchers have also demonstrated attacks on inference using adversarial examples. Carefully crafted inputs are fed to the model, causing its inference to be biased in a direction chosen by the attacker.

Where the attacker has access, poisoning the training data can be used to influence model operation. A motivated attacker might use these mechanisms to affect network operations or steal a service. The training pipeline, resulting models, and surrounding application context should be analyzed for susceptibility to such attacks.

Automated model quality assurance is crucial for technical robustness and safety. Models must be thoroughly tested against performance metrics that reflect potential real-world scenarios. These metrics are use case and model specific. For instance, in the case of a classification model, accuracy, false positive or false negative rates might be measured, while in the case of clustering, Silhouette Coefficient⁸ and Dunn Index⁹ might be chosen.

It is also important to communicate this information in an understandable and useful manner to model recipients, keeping in mind that they may not have expertise in AI. For example, when communicating a performance metric about a model, information should be included about its meaning and what values are considered good or bad.

Since a model's performance depends on the data set used for training and evaluation, data quality is essential for model quality. A training data set should accurately represent reality and cover the events or objects of interest: the training data set must have the same statistical properties the real objects have, and if there are relationships between the attributes of the real object or among the real objects, those relationships must be preserved in the training data set.

The RET use case mentioned earlier shows that poor AI decisions could lead to interference and compromised network performance. Anywhere an AI algorithm is used in the operation of a network, a failure of that algorithm can lead to inefficiency, instability, or, at worst, downtime.

Another important concern is that AI models could, inadvertently or maliciously, take actions that are unsafe for humans. As already mentioned, telecom systems by nature are not safety-critical, and the danger could be reduced network performance. One scenario could be when the model explores the space of all possible states and actions. This becomes significantly important for RL, where space exploration is seen as an effective way to train an RL agent to capture a near-optimal policy. However, unchecked exploration can lead the system to visit a dangerous state, for example, when the system tries to tilt the antenna at an overly high angle. Safe RL methods provide a shield to block unsafe actions that might result from free exploration of state-action spaces. The intention is to allow the agent some state exploration of the environment while having boundaries using safety specifications defined by a human developer. The specifications, or boundaries, can be user dependent. One such use case where these techniques are successfully tested is RET Optimization¹⁰.

Conducting invariance and directional expectation tests is also essential to assess and assure the model's robustness. In an invariance test, label-preserving perturbations are applied to inputs and the model prediction is expected to remain the same. In a directional expectation test, a set of perturbations are made to the input which should have a predictable effect on model output.

Social and environmental well being

AI can be used to create positive benefits for society, such as by helping protect the environment. Ericsson considers communication to be a fundamental human right, so the availability of the network is core to societal well-being. The findings of this white paper support this conclusion. AI, by helping service providers create telecom networks that are more reliable, ubiquitous, and inexpensive, contributes to the social goal of universal communication. But there are possible negatives, such as the privacy aspects discussed above. ML training can be energy intensive, so careful cost-benefit analysis is needed before it is employed. ML might be used where there are potential safety or societal risks (for example, control of critical infrastructure). Minimizing those risks is important, and this can be done using the techniques described in this white paper.

AI can help improve network operations and energy consumption. Large volumes of data can be used to optimize important goals like performance, reliability, capacity, and energy usage. Traditional optimizations, written by programmers, typically used only a few parameters and simple algorithms with limited results. AI allows large numbers of parameters to be used, better optimizations, and therefore better performance. Ericsson teams looking at specific use cases have shown that AI can lead to significant energy savings compared to traditional algorithms¹¹.

AI in telecom can be useful beyond the simply better operation of the network. During the COVID-19 pandemic, Ericsson engaged in a joint project with a service provider, government officials, and two hospitals¹². The service provider provided anonymized and aggregated data about people's movements, taken from their network. This was combined with vaccination, antibody test, and hospital COVID patient admission data. A series of ML models used the data to predict admissions two to three weeks into the future. In eleven of sixteen weeks, the predictions had an error rate of less than thirty percent. Better resource planning for hospitals, especially during a crisis, leads to better patient care. This demonstrates that AI and telecom networks and data can be used to benefit society in novel and perhaps unexpected ways.

Conclusion

The benefits of AI in telecom networks are only just beginning to be leveraged but will clearly be an important and integral element in future networks. Trusting those networks requires trusting the AI, which can be achieved by following the presented guidelines. However, these present a number of challenges:

Ensuring that humans retain oversight and control over AI systems, even when highly automated and operating at high speeds.

Providing information about AI operations, using techniques such as XAI, while maintaining a fine balance between the privacy of models and data and transparency

Protecting the data of users and businesses, while still using it to deliver AI that benefits them

Understanding how AI might affect different communities and preventing adverse impacts

Making AI systems robust and safe, yet practical to train and

Considering how AI affects society broadly, both to prevent adverse impacts and to promote beneficial uses.

Trusting the AI, that is having confidence that it operates as intended and does no harm, requires diligence in addressing each of these challenges. Ericsson is working to continuously improve its AI systems, making them, and consequently their products, more trustworthy.

[35. AI ethics & governance](#)

What you can do

Establish AI governance and principles

Adopt responsible AI principles that include clear accountability and governance for its responsible design, deployment and usage.

Assess your AI risk

Understand the risks of your organization's AI use cases, applications and systems, using qualitative and quantitative assessments.

Systematically test responsible AI

Perform ongoing testing of AI for human impact, fairness, explainability, transparency, accuracy and safety. Use top responsible AI tools and technologies to mitigate any problems.

Conduct ongoing monitoring and compliance

Consistently monitor AI systems and oversee responsible AI initiatives while executing mitigation and compliance actions.

Manage the impact on your workforce, sustainability, privacy and security

A responsible AI compliance program will need to engage cross functionally to address workforce impact and compliance with laws, sustainability, privacy and security programs across your enterprise.

What you'll achieve

Reduced risk through compliance

A proactive strategy to use AI responsibly from the start will help organizations better prepare to manage risk and comply with emerging regulations.

Trust and value

AI systems that are compliant and regulation-ready will help attract new customers, retain existing ones and build brand and investor confidence.

Retained talent

Demonstrating a commitment to ethical practices will help attract and retain top talent who are motivated by a sense of purpose and shared

36. [SAP AI ethics](#)

SAP delivers AI based on the highest ethical, security, and privacy standards

At SAP, we care deeply about the impact of AI on the well-being of people, the health of our customers' businesses, and society and economies. We address bias and discrimination concerns when designing AI into our applications, and work to be transparent and explainable. We uphold our highest standards with respect to data privacy, data protection, and cybersecurity.

Building on the fundamental dedication to responsible AI that we started back in 2018, SAP is proud to further the commitment by affirming the 10 guiding principles of the UNESCO Recommendation on the [Ethics of Artificial Intelligence](#). These principles cover proportionality, safety, fairness, sustainability, privacy, human oversight, transparency, responsibility, awareness, and multi-stakeholder collaboration, ensuring that AI solutions respect human rights and contribute to sustainable development.

What guides our approach to AI

SAP designed guiding principles to steer the development and deployment of our AI solutions.

Dynamic foundation for continuous engagement with the ethical and socioeconomic changes of AI

We are driven by our values

We design for people

We enable business beyond bias

We strive for transparency and integrity in all that we do

We uphold quality and safety standards

We place data protection and privacy at our core

We engage with the wider societal challenges of AI

Operationalizing responsible AI across our business

Our AI ethics steering committee comprises senior SAP leaders who review our approach, processes, and product capabilities to ensure operationalization and alignment with our policies and guidelines.

SAP's commitment to protecting customer data in Artificial Intelligence

The strategic use of business data is integral to the success of AI, and by leveraging business data responsibly, we not only enhance the capabilities of our AI solutions, but also improve outcomes for your business. We remain firm in our commitment to prioritize data privacy and security as we release new AI capabilities.

Your data remains safeguarded within our ecosystem

Where permitted, we may use your data to help innovate and improve our products

We do not share your data with third-party LLM providers for the purpose of training their models

Our AI solutions are developed responsibly

The same rigorous standards that govern all SAP product development extend to our AI offerings

We stand by the security of your data

We employ advanced data security measures to protect your personal data at all times

[37. Capturing the power of Generative Artificial Intelligence to enhance the passenger experience](#)

Generative Artificial Intelligence (GAI) has dominated headlines of late, with the potential – and dangers – of this new technology highlighted around the world.

Many of you will have thoughts on the topic, or you may have been using the technology itself, while some of you may just be getting to grips with this fast-moving space.

Here I would like to shed some light on the work Amadeus' is currently undertaking, looking at the impact we can have on our industry and, most importantly, the traveler.

What is Generative Artificial Intelligence

First, it is important to stress the significance of GAI.

While AI - the ability to perceive, synthesize and infer information by computers - has been in use across our business for some years, we are now seeing the next-generation of development. Unlike other types of AI, which are focused on classification or prediction, GAI can create original content (such as text, images, voice, or other media), and execute a variety of other tasks based on prompts.

The technology has huge potential to transform various industries by engaging with humans, especially customers, in a personalized and scalable way.

From our location at the center of the travel ecosystem, it has the potential to impact on every stage of the journey, meaning each solution, platform, or technology we currently produce could be impacted.

This is not an incremental change – it is a potentially revolutionary one.

Amadeus' commitment for innovation

As you would expect, [Amadeus is committed to exploring the potential of this new technology](#). We are currently investing in new tools to help us harness the power of GAI, with teams across the business working to exploit its capabilities.

The impact will be felt throughout the whole traveler experience, [as already discussed in this blog from my colleague Rudy](#).

For example, in the planning phase GAI has the potential to create inspirational, traveler-centric search and shopping experiences. New tools will have the ability to search for, summarize and present information in newly accessible ways, driving up demand and lowering customer acquisition costs.

Stakeholders can get deeper insight than ever before into the motivations and actions of a traveler. With GAI, the purpose of a trip, expectations, willingness to pay – and much more – can be identified through chatbot conversations.

On-trip, travelers could see their needs met in more intuitive and personalized ways. Vivid content will be adapted to what the traveler is looking for, while conversational GAI chatbots can be used to ask the right questions to understand the traveler preferences. Disruptions to travel plans can be resolved faster by intelligent rebooking systems.

Finally, post-trip, GAI can help evaluate customer sentiment and allow travel businesses to respond to online reviews, boost their online reputation, stay in contact with customers in a more meaningful way, drive repeat business and maintain traveler relationships over sustained periods.

Guardrails for safe use of GAI

Alongside the excitement of GAI, we recognize the importance of addressing the potential concerns around the use of this technology.

Alongside the generation and proliferation of false information, other risks include the potential for GAI use resulting in bias and discrimination. There is also the risk of unintended sharing of sensitive data, while we must watch for any potential hallucinations (a confident response by a GAI that is not based on verified source data) in any created content, as well as cybersecurity risks.

To mitigate these concerns and to ensure Amadeus has a trusted, data-secure way to take advantage of these technologies, we are strengthening our existing policies, processes and governance, as well as employee awareness.

In addition, AI technology is required to be designed following Amadeus' AI Ethics Principles in order to ensure ethical, transparent and responsible use (you can learn more on these principles [here](#)).

We are also closely monitoring the emergence of new regulations, in particular the EU AI Act, and taking steps to ensure our compliance. We also welcome legislation to protect fundamental freedoms, encourage responsible development in AI, while ensuring that innovation is allowed to flourish for the benefit of the industry and traveler alike.

Ecosystem Approach

Amadeus is at the heart of the travel ecosystem and this is a fast-moving space. [Our strategic partnership and joint innovation program with Microsoft](#) allow us to work closely with leading experts on GAI to address travel industry needs with the latest foundation models and cutting-edge solutions.

The Microsoft investment in OpenAI, and work to make sure the GPT models are enterprise ready in the Azure environment, means we can accelerate bringing out solutions that are ready for our customers to start using.

We are also working with [Accenture to develop the GAI-powered interactive travel assistant for Cytric Easy](#).

By taking a responsible approach, by harnessing the combined power of the travel ecosystem, and by thinking beyond today, we can power progress across the entire travel industry.

We are excited about what the future holds.

38. [Ai in product development](#)

AI Isn't a Shiny New Toy. Or is it?

How we got here—and how to realistically think about AI when building products.

Everybody is talking about Artificial Intelligence these days. In fact, I can't remember the last time I attended a cocktail party or read anything on the Internet without hearing about ChatGPT and how it will save (or destroy) the planet.

A significant contributor to this newfound popular interest is the advent of the aforementioned ChatGPT (short for Chat Generative Pre-trained Transformer). If you haven't heard about it (I know, unlikely), it is a chatbot that was launched by OpenAI in November 2022 to great public acclaim (and some consternation). But is it a good thing or a bad thing? Depends on your point of view and how you use it. If you're a 6th grader who doesn't mind bending the rules, it'll write a pretty good term paper for you on Abraham Lincoln, the War of 1812, or Star Trek.

On the other hand, it sometimes makes things up, for example:

I just asked it: "Talk about the technical director of LEGO Universe."

ChatGPT: "The Technical Director of LEGO Universe was Mark Hansen. As the Technical Director, Hansen played a crucial role in the development and implementation of the massively multiplayer online game (MMOG) LEGO Universe, which was released in 2010."

That's kind of cool, but I was the Technical Director, not Mark.

It was also trained on data that is now a couple of years old, so there are a lot of things it just doesn't know about. For example:

My question: "Who is in charge of Twitter?"

ChatGPT: "As of my last knowledge update in September 2021, Jack Dorsey was the CEO of Twitter. However, please note that executive positions can change over time, and it's recommended to verify the current leadership by referring to the latest news or official Twitter announcements."

As someone who studied artificial intelligence before most people had even heard of the term, it's interesting to hear the swirling conversation about it in 2023. In this blog, I'll give you a brief history of AI and the events that led us to where we are today—and how to use that information before proceeding with AI in your product development process.

A brief history of AI & how we got here

I received my Master's degree in AI from Yale back in 1985, a year that fell between two notable and well-documented "AI Winters," a term that refers to a period in the history of AI research when interest in the field declined significantly. This term was coined in 1984 at the annual meeting of the American Association of Artificial Intelligence (AAAI) and is a process that begins with pessimism in the AI community and then in the press, followed by significant reductions in

funding, then followed by the end of serious research. Three years later, the billion-dollar AI industry began to collapse (again).

There were, essentially, two different AI Winters:

1974–1980

1987–1993

What ended the first AI Winter? A number of factors contributed, including new theoretical and algorithmic developments, increased computing power, industrial and commercial applications, and government support and funding. And the second AI Winter? In short: it yielded massive, ongoing, real-world successes in a large number of fields like speech recognition, machine vision, face recognition, machine learning, logistics planning, decision-support systems, and the like.

Since the mid-1990s, AI has once again started receiving massive attention due to its potential to revolutionize various industries, from healthcare to finance to retail. Such businesses are looking to incorporate AI into their operations to improve efficiency, reduce costs, and gain a competitive edge.

However, before jumping on the AI bandwagon, it's essential to understand how we got here and how to realistically think about AI when building products. It's also important to remember that systems that seem smart might not be as smart as we think. This error has previously been the major driver in the hype that has led to both previous AI Winters.

AI is not new, but it is shiny. How long it stays shiny (this time) depends on both its actual performance in industry and education and on its hype caused by misperceptions and misleading reporting.

So, what events and developments in AI brought us here? What works? What doesn't? And what does the history of AI teach us as we build new tools and products?

While AI has come a long way over the past 70 years, it's essential to recognize that it's not a magic solution to all problems. It is not a panacea that can be implemented without careful consideration of its limitations and potential risks.

Our own hype, over-reliance, and over-estimation regarding its current apparent success could cause a new AI Winter (or at least a cooling of enthusiasm and public support). ChatGPT is a good example of how this might occur: there are now claims that ChatGPT can diagnose diseases, pass the LSAT and MCAT, etc. What will happen when it fails as a super-human brain? This is something we should be aware of with this technology and related ones. As the Bard pointed out, not all that glitters is gold.

A critical aspect of realistically thinking about AI is understanding its limitations. Machine Learning systems are only as good as the data they are trained on. If the data is biased, the AI will make biased decisions. Therefore, it is essential to ensure that the data used to train the system is diverse and representative of the population it will be applied to.

Additionally, it's essential to understand the potential risks of implementing AI. AI can be used to automate processes, which can lead to job losses, and it even has the potential to manipulate people or make decisions that have a significant impact on people's lives, like in healthcare or criminal

justice. Therefore, it's crucial to consider the ethical implications of using AI and have measures in place to ensure that the AI is being used responsibly in your business.

How to think about AI for product development

When building products with AI, it is crucial to understand what AI can and cannot do. AI is excellent at processing and analyzing large amounts of data, identifying patterns, and making predictions based on that data. However, it cannot replace human intuition and decision-making entirely. It is essential to have a clear understanding of the problem you are trying to solve and how AI can help you solve it.

So, what should you consider when bringing AI into your product development processes? Here are some questions you might ask yourself:

First, ponder the ethics of what you're doing. Will the system you are hoping to build reduce public security or safety? Will it put people out of work for no reason? Also, consider if there is enough (and appropriate) data for the machine to learn what you want it to learn. Think about what biases it might be acquiring. Will the system infringe on personal privacy, liberty, happiness? Will any groups of people be disenfranchised as a result? Are you stealing anyone's intellectual property?

And just how does one use AI in product development?

This is a very large topic, but to break it down a bit, here are a few important options (out of many):

Machine Learning: This is a branch of AI that involves training models on data to make predictions or perform specific tasks. It can be used to develop software with capabilities such as image recognition, natural language processing, recommendation systems, and more. Developers can build and train models using popular ML frameworks like TensorFlow or PyTorch.

Natural Language Processing: This technology focuses on enabling computers to understand and process human language. It can be used to develop software applications like chatbots, language translators, sentiment analysis tools, or even automated content generation systems.

Computer Vision: This involves training models to understand and interpret visual data, such as images and videos. It can be used to build software for tasks like object recognition, facial recognition, autonomous vehicles, or even augmented reality applications.

Intelligent Automation: AI can be used to automate repetitive or mundane tasks, enhancing productivity and efficiency. This can involve building software applications that leverage techniques like robotic process automation (RPA) or using machine learning algorithms to automate data analysis and decision-making processes.

AI-based Code Generation: Tools, including ChatGPT, are now able to take requirements (and other specifications) and generate working code.

Predictive Analytics: AI can analyze large datasets and identify patterns, enabling predictions and forecasting. This can be useful for software applications in various domains, such as finance, healthcare, sales forecasting, and supply chain management.

To leverage AI in product development, developers need to have a good understanding of AI concepts, programming languages, and frameworks relevant to the specific application. They should also have access to quality data for training AI models and a robust infrastructure to deploy

and scale the software. Collaboration with data scientists and domain experts can further enhance the effectiveness of AI-driven software development.

In Summary

AI is a powerful tool that can help businesses improve their operations and gain a competitive edge. However, it is essential to understand that AI is not a magic solution to all problems. Realistically thinking about AI means understanding its limitations, potential risks, and ethical implications. When it comes to product development, it also means having a clear understanding of the problem you are trying to solve and how AI can help you solve it. By doing so, businesses can successfully incorporate AI into their product development operations and avoid potential pitfalls.

Today, AI is once again generating excitement and optimism about its potential to revolutionize many industries. However, the history of the AI Winter serves as a reminder of the need for realistic expectations and continued investment in AI research and development to ensure that the technology continues to progress and deliver on its promise.

39. [Atlassian Intelligence is built on trust](#)

Atlassian Intelligence is built on trust

Secure

Powered by our trusted platform, Atlassian Intelligence keeps your data secure and private.

Transparent

Stay in control of your data and get visibility into how each feature works.

Scalable

Accelerate critical business workflows with ease across your entire organization.

Atlassian Intelligence brings the power and magic of AI into Atlassian's Cloud products. Built with our [Responsible Technology Principles](#) in mind, Atlassian Intelligence handles your data responsibly.

Frequently asked questions

Hide all

[How does Atlassian Intelligence work?Hide](#)

Atlassian Intelligence combines state-of-the-art models developed by OpenAI with the power and data inside we provide a native artificial intelligence experience that is contextual to you, your teams, and your workflows, of your data. To learn more about the technology that underpins Atlassian Intelligence visit this [page](#).

[How should I use Atlassian Intelligence?Hide](#)

Some of the models used as part of Atlassian Intelligence, including the models developed by OpenAI, generative AI, and are probabilistic in nature. This means that their responses are generated by predicting the most probable next token that they have been trained on.

Because of this approach, these models can sometimes behave in ways that are inaccurate, incomplete, or untruthful that you receive could not accurately reflect the content they are based on, or generate content that sounds reasonable but should not be relied on.

We encourage you to think about the situations when you use Atlassian Intelligence — for example, not in situations where accurate information about people, places, and facts — and review the quality of the responses you receive before using them.

[How do I start using Atlassian Intelligence?Hide](#)

Atlassian Intelligence features are automatically activated for any site(s) on a Premium or Enterprise Cloud plan. For more information about these features, see [Atlassian Intelligence features](#).

[Which Atlassian Cloud plans include Atlassian Intelligence?Hide](#)

Atlassian Intelligence is a feature of Atlassian Enterprise and Premium Cloud plans, which include [Jira Software](#) and [Confluence](#).

[Which Atlassian Intelligence features will be automatically activated?Hide](#)

Discover which Atlassian Intelligence features will be automatically activated by reviewing [this table](#).

[Can I turn off Atlassian Intelligence if my organization is not yet ready to use it?Hide](#)

Yes. If you are an admin, you can log into Atlassian Administration (admin.atlassian.com) and remove Atlassian Intelligence at the product level. Once deactivated, you will see a confirmation flag in your instance. For more details please reach out to [support](#) directly.

[If I deactivate Atlassian Intelligence now can I reactivate it in the future?Hide](#)

Yes. You can reactivate Atlassian Intelligence now or anytime in the future. Once Atlassian Intelligence is activated, newly released Atlassian Intelligence features are automatically available to you.

For more details please [visit our documentation](#).

[Does the Atlassian Privacy Policy apply to Atlassian Intelligence?Hide](#)

Our [Privacy Policy](#) covers all of our products and services, including Atlassian Intelligence.

[Does the Atlassian Customer Agreement apply to Atlassian Intelligence?Hide](#)

Yes, Atlassian Intelligence is covered by the [Atlassian Customer Agreement](#). Additionally, we introduced [Atla](#) are incorporated by reference into the Atlassian Customer Agreement, which govern your use of Atlassian Inte

[How does Atlassian Intelligence use customer data?Hide](#)

Atlassian Intelligence processes your user's inputs to provide the outputs your user has requested. We may also process data within your product instance that the user has permission to view and include that data with the user inputs, so that the outputs are relevant, and contextual responses.

Our partner, OpenAI, neither retains your inputs and outputs nor uses your inputs and outputs to improve its services.

However, Atlassian may store your inputs and outputs for a limited period of time to reduce latency, such as when required to provide a feature, such as displaying a search history. To learn more about which features store data, see our [page](#).

If you would like to be notified of any material changes to this policy, please [subscribe here](#).

[Does OpenAI store Atlassian customer data?Hide](#)

No, OpenAI does not store the data you submit or the responses you receive.

[Does Atlassian send customer data to OpenAI's platform to train its services?Hide](#)

The data you submit and the responses you receive via Atlassian Intelligence are not used to fine-tune or improve our services. Each data request is sent to OpenAI individually, over an SSL encrypted service, to process and send back to you.

[What are you using my inputs and outputs for?Hide](#)

We process your inputs to provide you with the outputs you requested. We do not use your input or output for

[Are you using my inputs and outputs to train Atlassian Intelligence?Hide](#)

Atlassian Intelligence uses only data about how you interact with our features, such as the people you work with and feedback you provide. Atlassian Intelligence does not use your inputs or outputs.

[Does Atlassian Intelligence use my data to serve other customers?Hide](#)

The data you submit and the responses you receive are used only to serve your experience. They are not used or shared between customers.

[Can we opt out of our data being used in training Atlassian Intelligence while still being able to use the features?Hide](#)

You can opt out of using Atlassian Intelligence at any time. If you choose to use Atlassian Intelligence there are no outputs, only the feedback you provide.

[Is any data transferred outside our current site?Hide](#)

Data is transferred outside of the current site for specific Atlassian Intelligence features that use partners like OpenAI. Even though the data is transferred, it follows existing Atlassian [security practices](#). For Atlassian Intelligence, data is transferred individually, over an SSL encrypted service, to process and send back to Atlassian.

Please refer to our list of data sub-processors for all LLM partners [here](#).

[Who can access my data in Atlassian Intelligence if we enable the feature?Hide](#)

Atlassian Intelligence respects all of your existing permissions; a user may get a different set of results based on their permissions which may differ from another user.

The data a user has access to is not limited to the site they're working on. Due to the connected nature of our products, data from a Jira issue or Confluence page, information can be pulled from across those experiences to inform a response.

To the extent you have installed or are using Marketplace apps, have granted access outside of your organization, or are working with a solution partner, those second or third parties will have access to data (not specific to Atlassian Intelligence).

[How are the Atlassian Intelligence capabilities ensuring my data is protected?Hide](#)

Atlassian Intelligence currently leverages large language models from OpenAI. Atlassian Intelligence follows Atlassian Intelligence, each data request is sent to OpenAI individually, over an SSL encrypted service, to OpenAI does not use Atlassian Intelligence inputs or outputs to train its models. For our existing Atlassian Intelligence log the inputs and outputs.

[What additional assurances do we have that our data is protected?Hide](#)

All requests from Atlassian services to OpenAI follow a central process and infrastructure to ensure that the services that use the central process go through an Atlassian standard for authentication and authorization.

All requests to OpenAI's APIs from the OpenAI Gateway service are made over an encrypted connection. Beyond this, we inherit and rely on [OpenAI's security and privacy controls](#).

[Does Atlassian Intelligence respect data residency?Hide](#)

Yes. If you have turned on data residency, all of your [in-scope product data](#) will remain stored in the region you

[Does Atlassian Intelligence impact my compliance with GDPR?Hide](#)

We are committed to helping our customers stay compliant with GDPR and their local requirements. As we will process and transmit data for Atlassian Intelligence in accordance with our [Privacy Policy, Data commitment](#).

[Is Atlassian Intelligence SOC 2 and ISO compliant?Hide](#)

Although many of the systems and services used by Atlassian Intelligence hold these certifications and adhere to these standards, Atlassian Intelligence itself has not undergone external assessment for SOC 2 or ISO certification. For Atlassian Intelligence services and tools, we will aim to include them in our standard audit certification reporting cycle.

[Is Atlassian Intelligence HIPAA compliant?Hide](#)

No, at this time Atlassian Intelligence is not HIPAA compliant and our Business Associate Agreement (BAA) and Business Associate Addendum (BAA Addendum) are required to comply with HIPAA, we recommend that you do not opt-in to this feature until we have expanded our HIPAA compliance.

[Can I limit the data or restrict the data that is shared with Atlassian Intelligence?Hide](#)

We currently only offer opt-out controls at the product level. We plan to offer more granular controls to customers and will update this page once controls are available.

[Does Atlassian Intelligence respect existing permissions?Hide](#)

Atlassian Intelligence honors all existing permissions within each feature. Users will not be able to create or edit content that they do not have access to.

Ex. #1. You would not see issues/projects that you do not have access to if you do a natural language search to Jira pages sourced for an answer to a question if you did not have access to those pages.

Ex. #2. if a Confluence user executes a smart search, the results shown will take into account the pages and spaces they have access to and ignores restricted pages and spaces.

[Where can I learn more about Atlassian Intelligence?Hide](#)

Visit [our guide](#) on Atlassian Intelligence to learn how teams can accelerate work, increase efficiency, and provide better customer experiences.

40. [Flutterwave strategic agreement](#)

Flutterwave to further power global digital payments on the Microsoft Azure cloud platform.

LONDON, June 22, 2023 /PRNewswire/ -- Flutterwave a leading African payments technology company today announced it is working with Microsoft to build its next generation platform on Microsoft Azure, powering payments infrastructure across the African continent and beyond. This agreement reflects Flutterwave's commitment to give businesses and individuals access to global-grade services across all of Africa and drive digital transformation around the world. With Flutterwave and Microsoft's plans to power payments to-and-from Africa, this collaboration is an incredible opportunity to impact growth across the continent.

Through this engagement, Flutterwave will support the accelerated growth of transactions processed on Flutterwave platform for global clients like Uber, Netflix, and Microsoft, solidifying Azure's role in facilitating a seamless, reliable, and secure payment experience.

Key Flutterwave products such as Flutterwave for Business, Send by Flutterwave, Flutterwave Store, and Flutterwave for Fintech Platform, are being developed and transitioned onto the robust Azure cloud platform. Moreover, Flutterwave uses Azure OpenAI Service capabilities, enabling the scaling of its product offerings to millions of merchants worldwide.

"Microsoft has been an invaluable partner, providing a platform that allows us to deliver consistently high-quality services to our clients," stated Olugbenga Agboola, Founder and CEO of Flutterwave. "As we manage high-volume payment processing, particularly during peak periods, the robustness, reliability, and scalability of Microsoft Azure become critical. As such, deepening our collaboration with Microsoft is the most logical step forward for us." It means Flutterwave will

continue to drive the transformation of global commerce, taking full advantage of the diverse and expanding range of services offered by Microsoft.

"Our development on Microsoft Azure has set a strong foundation for Flutterwave," said Gurbhej Dhillon, Flutterwave CTO. "Their platform provides us with significant developer leverage, which we harness in service of our clients. Looking to the future, we're excited about the possibilities of scaling with Azure OpenAI Service, which will enable us to serve even more merchants worldwide," added Dhillon.

"We have proudly supported Flutterwave's core operations with Microsoft Azure for many years. We are excited to further fuel their growth and innovation through this expanded collaboration," said Mike Gaal, Microsoft Corporation General Manager. "Our mission is to empower every person and every organization on the planet to achieve more. Working with Flutterwave will take us a step closer to achieving our mission In Africa," added Gaal.

About Flutterwave

Flutterwave is the leading payments technology company that enables businesses across the world to expand their operations in Africa and other emerging markets through a platform that enables local and cross-border transactions via one Application Programming Interface (API). Flutterwave has processed over 400M transactions in excess of USD \$25B and serves more than one million businesses, including customers like Uber, Airpeace, Bamboo, Piggyvest, and others. The company's key advantage is connecting businesses to various local and international payment types to enable them to expand globally. It also enables cross-border transactions from the diaspora to African countries via its SendApp product. Flutterwave processes payments via multiple payment modes, including local and international cards, mobile wallets, bank transfers, and Google Pay. The company has an infrastructure reach in 34 African countries. For more information on Flutterwave's journey, please visit www.flutterwave.com.

41. [JPMorgan Chase Restricts Staffers' Use Of ChatGPT](#)

JPMorgan Chase has restricted the use of ChatGPT by its staff, Bloomberg and the Telegraph reported, becoming the latest organization to limit the use of OpenAI's chatbot in the workplace following the likes of Amazon and several [U.S. universities](#). KEY FACTS

[According to](#) Bloomberg, the ban wasn't triggered by a particular event or mishap, but is instead part of the company's "normal controls around third-party software."

The restriction applies to employees across the financial services giant's various divisions, the report adds.

The Telegraph [previously reported](#) that the decision was driven by concerns about sensitive financial information being shared with the chatbot that could lead to regulatory action.

Users have demonstrated a multitude of use cases for the chatbot, which includes summarizing regulatory documents and earnings reports—although its [accuracy](#) remains a concern.

It is unclear whether other financial institutions will follow JPMorgan Chase and place similar restrictions on the use of ChatGPT.

KEY BACKGROUND

Last month, Amazon [warned](#) its staffers against sharing any code or confidential information about the company with OpenAI's chatbot—which has [received](#) billions in investment from Microsoft. Business Insider reported that this decision was undertaken after the company found examples of ChatGPT responses that resembled internal Amazon data. Apart from companies, several major educational institutions across the U.S. have [banned](#) the use of ChatGPT in their classrooms. Teachers have expressed concerns that tools like ChatGPT could make cheating in exams and assignments a lot easier.

TANGENT

The Chinese government wants to [completely block](#) access to ChatGPT as it does not comply with the country's censorship laws. While ChatGPT's website was always blocked by China's 'great firewall,' some users were able to circumvent this by using third-party tools on popular web platforms like WeChat to access the chatbot. Regulators in Beijing have now ordered its tech giants including Tencent and Ant Group to crack down on such third-party tools.

42. [Wells Fargo, artificial intelligence, and you](#)

We're in a new era of artificial intelligence. It makes headlines daily, such as AI-generated songs that sound like your favorite pop star. Today's growing ecosystem of revolutionary AI tools has sparked unprecedented interest in this area of technology. Just look at [ChatGPT](#). OpenAI's natural language AI chatbot became one of the world's fastest-growing web platforms just two months after launching in late 2022.

While AI is today's trending topic, Wells Fargo has invested in AI technology for the better part of a decade. Those investments are now paying off through better experiences for customers.

“Over the past two or three years, the use of AI and machine learning tools has become more streamlined, allowing them to be more easily integrated into business applications,” said Swarup Pogalur, Wells Fargo's head of digital and AI capabilities engineering. “At Wells Fargo, we've been on a journey to AI adoption — from a digital adopter to a digital leader — while carefully managing our risks to ensure consistency with regulatory oversight.”

New to artificial intelligence? Here's what you need to know.

The simple definition of AI is that it's a problem-solving machine. Artificial intelligences are designed to mirror or simulate human logic by taking in information and learning from each interaction.

This technology is far from science fiction. Just look in your Wells Fargo Mobile app to see it in action. [Fargo™](#) is a virtual assistant that helps customers get answers to their everyday banking questions on their smartphone. [Fargo™](#) uses Dialogflow, Google's conversational AI, to

understand what you want to do by comparing what you type or say in the app to data from countless consumer conversations.

But there are many other types of AI that shape your banking experience. For example, the Customer Engagement Engine gives Wells Fargo bankers insights into what sort of goals or conversations would be the most useful for customers.

“How do we draw insights from data to drive better customer outcomes and operational efficiencies? We looked at this as a significant innovation opportunity for the bank,” Pogalur said.

AI gives the technology you touch daily a deeper understanding of who you are. That has countless benefits for customers.

Representatives of two in three of LinkedIn’s 50 Top U.S. Companies agree that [AI already helps their businesses](#) be faster and smarter. Another one in three of top companies, a list that includes Wells Fargo, say that they expect AI to make even larger gains over the next five years.

One AI-based technology platform at Wells Fargo that will have a big impact soon is the Enterprise Open Source Data Science Platform. It lays the groundwork for building and delivering innovative tools and improvements for customers much more quickly by arming Wells Fargo data scientists with AI and machine learning building blocks they can use to develop AI solutions in an accelerated manner and help design better data driven customer experiences. The platform will help the company stay agile through upcoming AI transformations.

“Just like every other industry, financial services will see a significant disruption in how we build products and services we offer,” Pogalur said. “But we have a strong position around open banking, meaning as the AI space evolves, we are able to create banking products that are super-charged with AI and be where customers are.”

Wells Fargo is preparing for major changes with AI in the next few years. Our engineers are building the foundational platforms and key components that will allow us to accelerate the deployment and use of AI in a safe and sustainable way.

We are committed to responsible technology and strong risk management; this is especially critical for AI-based systems. Wells Fargo recently endorsed the [AI Bill of Rights](#), in which the White House’s Office of Science and Technology Policy calls for safe and effective uses of AI that do not expose consumers to discrimination and abusive data practices.

“AI Products and Solutions and the AI technology landscape is going through a phase of rapid innovation and has opened up a wealth of opportunities to reimagine how we engage with our customers and employees by enabling personalized and intuitive experiences,” Pogalur said. “Wells Fargo is very well-positioned to learn and adopt to these opportunities in a thoughtful way because we have the talent, the leadership, and the capabilities.”

[43. Mizuho permits 45,000 employees to use generative AI](#)

Some 45,000 employees of banking holding firm Mizuho Financial Group, Inc will be allowed access to generative artificial intelligence (AI) this week, according to reports.

Employees of the Japan-headquartered firm's core lending units will be able to use Microsoft Corp's Azure OpenAI service, Bloomberg reported, citing Toshitake Ushiwatari, general manager of Mizuho's digital planning department.

The news comes despite distrust among many organisations about AI tools, such as OpenAI-developed ChatGPT, due to privacy concerns.

Ushiwatari, however, noted that the bank cannot shy away from generative AI's potential to lift society.

"This is something we have to do, otherwise, we get left behind," Ushiwatari told [Bloomberg in an interview](#).

After the company's core lending units, the banking holding firm plans to introduce AI tools to its brokerage unit next month, Ushiwatari added.

Mizuho joins the growing list of organisations that are permitting generative AI in the workplace, which include Japan-based firm [Daiwa Securities Group](#) and New York-headquartered [McKinsey and Company](#).

Using Azure OpenAI

Most Read

[HR manager faces jail time for falsely declaring salaries](#)

[Very few Singapore job postings offering remote or hybrid roles: LinkedIn](#)

[Samsung under investigation after employees exposed to radiation: reports](#)

Azure OpenAI allows users to "focus on creating innovative solutions that deliver value to their organisations and customers," according to [Microsoft's website](#).

For Mizuho, Bloomberg reported that Ushiwatari's team is planning an "ideathon" as early as next month and is brainstorming ways to encourage employees to experiment with the technology.

According to the report, managers and rank-and-file employees are already submitting "dozens of pitches" for ways to use the technology before it is even installed.

One of the suggested uses of the generative AI tool is for "a one-stop reference point for the bank's vast trove of internal rules, processes and other manuals," according to the report.

In Japan, the use of AI tools in the workplace is becoming more accepted.

A survey from automatica found that 76% of Japanese employees would [welcome AI services](#) to help them make the right decision in the workplace.

44. [SBI Embraces AI and ML Technologies to Transform Banking Operations](#)

SBI Embraces AI and ML Technologies to Transform Banking Operations

The article discusses how the State Bank of India (SBI) is leveraging AI and ML technologies to transform banking operations. It highlights the use of AI and ML in the banking sector.

In a bold move to revolutionize its banking operations, the [State Bank of India](#) (SBI) has announced its plans to leverage the power of [artificial intelligence](#) (AI) and [machine learning](#) (ML). The country's largest lender aims to enhance its decision-making processes and operations by deploying NextGen Data Warehouse and Data Lake, as well as exploring new partnerships with fintech and non-banking financial companies (NBFCs) for co-lending.

SBI highlights its commitment to using cutting-edge technologies like AI, ML, and business analytics to improve its product offerings and ensure customer satisfaction. The adoption of AI and ML is expected to bring about significant changes in the way the bank serves its customers.

One of the major areas which will have a profound impact is [cybersecurity](#) and fraud detection. With the increasing number of digital transactions taking place every day, SBI recognizes the need to strengthen its security measures. AI can help identify and track potential fraudulent activities, enabling the bank to minimize risks and protect its customers.

Another exciting application of AI in banking is the use of [chatbots](#). These virtual assistants can provide round-the-clock support to customers, offering personalized assistance and recommending suitable financial services and products based on user behaviour.

AI and ML technologies also play a vital role in loan and credit decisions. Traditionally, banks heavily relied on credit history and scores to determine creditworthiness. However, these systems are prone to errors and may not accurately assess an individual or company's ability to repay loans. By leveraging AI-based loan and credit systems, SBI can analyze customer behavior and patterns, providing a more comprehensive assessment of creditworthiness and minimizing the risk of default.

Moreover, AI's impact on risk management cannot be understated. By analyzing past behavioral patterns and external factors, AI algorithms can predict potential risks and enable banks to make informed decisions. This is crucial during volatile times when businesses need to exercise caution.

Regulatory compliance is a paramount concern for banks. AI technology, utilizing deep learning and natural language processing (NLP), helps banks stay updated with changing compliance requirements, ensuring faster and more efficient operations.

Furthermore, AI-driven predictive analytics will help identify sales and cross-selling opportunities, improving revenue generation. Process automation through robotic process automation (RPA) algorithms will increase operational efficiency, accuracy, and cost-effectiveness by automating repetitive tasks.

Overall, SBI's and other bank's adoption of AI and ML technologies will transform their banking operations, leading to improved decision-making, customer satisfaction, security, credit assessment, risk management, compliance, revenue generation, and operational efficiency.

45. HSBC principles for ethical use of data and AI

HSBC's Principles for the Ethical Use of Data and AI ACT CONSISTENTLY WITH HSBC'S VALUES Our use of data and AI is informed by the same ethical standards and values that we bring to our day-to-day work. • We do not use AI decision-making for a purpose that could not be justified if pursued through human decision-making. • We act with integrity by considering the societal impact of our use of data and AI on our employees, customers, shareholders, and communities. We put ourselves in the position of the customer, data subject, or employee and ask what they would find reasonable. • We hold ourselves accountable for the outputs of our use of data and AI and for explaining its purpose and benefit. PROTECT PRIVACY We seek to ensure our use of data and AI respects privacy and protects personal data by design. • When using personal data, we seek to use only that data which is appropriate for the purpose. • We employ appropriate measures to safeguard and control access to data that feeds into our data and AI use. • We embed privacy considerations into design and approval processes. • We aim to be transparent with our customers and other stakeholders about how we use their data, unless there is an overriding public interest (e.g. prevention of financial crime). 2 START WITH A CLEARLY DEFINED PURPOSE Any decision about using data and AI must include a definition of its purpose and the potential value it creates for customers and other stakeholders. • We identify the legitimate purpose of any use of data and AI. This approach ensures that we have a clear idea of the outcomes it could produce, including for customers. • We use data and AI to benefit our customers, our business, and/or our stakeholders – for example to create value for our customers, make banking safer, or to prevent financial crime. • We work to identify and give careful consideration to the impact on groups that may be adversely affected, whether customers, staff, or members of the general public. ADDRESS UNFAIR BIAS AND DECISION-MAKING We are alert to the inherent risk of training AI on biased datasets, which can lead to biased outcomes and unfair decision-making. • We seek to detect unfair bias and minimise its presence in our use of AI. • We consider and debate issues of bias from both a technical and ethical perspective. • We monitor our use of AI for unintended consequences by regularly reviewing inputs and outputs. 3 BE RESPONSIBLE FOR AI We are responsible for our AI systems and for ensuring that they are understandable and produce results as expected. • We establish clear accountability for our AI systems. • We test and monitor whether AI systems are working as they should both before being deployed and on an ongoing basis. • We ensure our people understand the limitations of AI systems as well as their capabilities. • We invest in the people and technology necessary to ensure that we understand AI and can use it responsibly. ADAPT GOVERNANCE TO MEET EMERGING NEEDS We ensure our control, testing, and audit mechanisms are adequate as data and AI evolves. • We adapt existing governance and approval processes to address the ethical implications of using data and AI. • We escalate and address concerns to appropriate accountable executives. • We only work with those we trust when partnering with or procuring from third parties in relation to data and AI. • Where we rely on a product or service provided by a third party in our use of data or AI, we apply the same principles and governance mechanisms to its use by HSBC that we apply to our own products

and services. • We exercise supply chain control and, where appropriate, will vet privacy and security protections of third parties before sharing personal data. 4 **CONTRIBUTE TO DEVELOPMENT OF BEST PRACTICE** We contribute to the development of best practice in the field of ethical use of data and AI, and we seek to learn both from our experience and from the experience of others. • We debate, discuss, and learn about the potential risks data and AI poses, and we encourage constructive challenge from colleagues at all levels of the organisation and from other stakeholders. • We provide meaningful forums for challenging and questioning design or use of AI. • We apply what we have learned from the use of data and AI. • We seek to participate in public dialogue on the ethical use of data and AI, using industry bodies, ethics committees, and other appropriate forums for the development of best practice in this area.

46. [How AI automation is helping](#)

In recent years, intelligent automation – the pairing of robotics and other technologies to handle repetitive tasks, support colleagues and simplify the customer experience – has transformed the financial services industry for the better.

For example, at Lloyds Banking Group intelligent automation eases the burden on our colleagues during particularly busy times. And without the help of automation, meeting the unprecedented demand brought on by the pandemic would have been a gargantuan task.

It's for these reasons that Lloyds Banking Group was one of the first financial service providers to embrace intelligent automation at scale – adopting tools such as virtual assistants and messaging technology.

What is intelligent automation?

In a nutshell, intelligent automation combines robotics and other autonomous systems to automate an array of tasks. Some of the tools that make up intelligent automation include:

Virtual assistant (VA)

Virtual assistants, or chatbots, use natural language processing to understand a person's intent.

These automated chat conversations can answer common customer queries. In turn, this allows for self-service, which frees up our telephony colleagues to focus on more nuanced tasks such as conversations with vulnerable customers or other more sensitive or urgent requests.

Robotic process automation (RPA)

Robotic process automation uses software to mimic the actions of our colleagues on a large scale – focusing on highly repetitive, rules-based tasks.

We have around 70 colleagues whose full-time role is to build robots with a focus to create capacity. Also, they deliver key benefits such as customer service, colleague satisfaction, risk reduction and fraud prevention.

Moreover, RPA allows us to respond in an agile way to peaks in demand, such as the Bounce Bank Loans and Mortgage Repayment Holidays driven by COVID-19, as well as tax year end peaks.

Intelligent products (IP)

Intelligent products create meaning from Lloyd Banking Group's unstructured data. In other words, they turn spoken and written words (e.g. calls, messages and e-mails) into machine readable text, and then apply machine learning to analyse, gain insight and give a better understanding of what action should be taken next.

For instance, a successful speech analytics roll out in our Group Customer Services department has helped us understand why a customer has called us, and how they feel about their experience - giving us the tools we need to transform their journeys.

As intelligent products mature, it will become increasingly vital to personalise our customers' experiences and also ensure we provide the right outcomes .

Intelligent automation in action

As one of the largest financial services providers in the UK, it was our responsibility to help our hundreds of thousands of customers who were facing financial uncertainty when the pandemic hit.

We saw unprecedented demand for existing services such as Mortgage Repayment Holidays, plus we needed to react extremely quickly to introduce new services and support new schemes, such as the UK Government backed Bounce Back Loans.

COVID-19 was also impacting our workforce and our third-party service providers too. With this in mind, we needed to create simple digital journeys in a matter of days and weeks, rather than the months and years normally associated with such large scale programmes.

Working groups were mobilized to agree an end-to-end design centred around the use of robotics to do all the heavy lifting. Through tremendous cross organisation collaboration, existing customer portals were modified, and new ones created.

Customers were directed to them via channels such as virtual assistants, on-line banking, our websites and through our colleagues.

The result was that within less than a week we were able to offer a new Mortgage Repayment Holiday process, and subsequently delivered a number of other new journeys such as:

Business Interruption Loans

Bounce Back Loans

Interest & Fee Free Overdrafts

Loan Re-financing

How intelligent automation is helping our colleagues

Without a robotics capability, easing the huge pressure faced by our front line colleagues simply would not have been possible. And customer service would have suffered as a result.

When the UK Government backed Bounce Back Loans were introduced, we expected an immediate and high response rate to the offer.

The solution directed our customers to an online form through which they could apply for a loan. Once submitted, fraud checks were carried out and the digital worker then reviewed the application to confirm the customer's eligibility.

On the first weekend we received over 30,000 cases. Since May 2020 we have granted over 300,000 loans with a value of over £9 billion, and supported over £1 billion on the first day following the launch. The new process ensured that customers had the money in their account the very next day.

As a result, we topped the customer satisfaction scores in a survey conducted by UK based 'Money Saving Expert' earning an 81% net positive score – beating the likes of Barclays and HSBC. Moreover, we were able to use robotics to grant customers in financial difficulties interest and fee free overdrafts of up to £500.

In the first week we received over 20,000 requests. To help handle this demand, customers were directed to an online form. The robots accessed the forms and performed validation checks and selected the correct tariff code based on the account type.

In short, instead of focusing their attention on the thousands of overdraft request phone calls, our colleagues were able to focus on cases which saw big spikes during the pandemic.

Is intelligent automation secure?

Intelligent automation boasts platforms that are safe and secure for our businesses to use in terms of availability and data. And the creation of these same secure online platforms is enabling customers and colleagues to share electronic documents – shortening the time to complete servicing journeys.

Incredibly, over four million documents have been processed through our Document Upload capability, eliminating the need for customers post or email documents, and saving around £3.2 million in paper saving and processing time.

We have also hosted 80,000 remote video meetings across our retail brands where customers can receive a face-to-face experience whilst sitting in their own home.

This also meant that branch colleagues can continue to provide that much needed face-to-face experience for the customer, whilst ID Verify allows customers to verify themselves remotely instead of being referred and having to make the journey into branch.

How Lloyds Banking Group will use intelligent automation in the future

The ways customers currently interact with us will result in more use of voice, text and video data in the future.

It follows that intelligent automation represents a big opportunity for Lloyds Banking Group to get closer to, and have better conversations with, our customers. Plus, these same tools will give our colleagues much needed support during especially busy times.

With this in mind, it's our aim to get a better understanding of customer queries in the future so that we can predict behaviours and needs.

Using this data effectively will bring Lloyds Banking Group closer to our customers, build trust, reassurance, confidence and empathy by delivering future customer needs and personalisation.

[47. Brazil's Itaú in 'very good position' to harness generative AI](#)

Itaú Unibanco, Latin America's largest private sector bank, sees itself as ready to reap gains with generative AI, although it is adopting a very prudent approach towards technologies using large language models (LLM).

"We feel that we're in a very good position to harness the potential of generative AI," the bank's chief data officer (CDO), Moisés Nascimento, said at the AWS Summit event in São Paulo.

Itaú's professionals are brainstorming hundreds of potential use cases involving generative AI with the idea of organizing everything later and working out the potential applications in an R&D AI lab the bank is setting up with AWS.

Despite that, nothing is expected to go live until the bank is certain about the implications and risks associated with the technology. Itaú has also vetoed third-party generative AI applications to avoid leaks of codes and systems, and is carefully monitoring how its workers interact with these platforms, said Nascimento.

"We don't have anything in production yet because we're being very cautious with the technology," he said, mentioning ethical, security and bias concerns related to generative AI.

The CDO is also in favor of creating a general [framework](#) to regulate AI.

The bank is closely following the evolution of two bills being discussed in congress on this topic, as well as European and North American discussions on that front, Nascimento said.

One of the more advanced bills was [submitted](#) by senate president Rodrigo Pacheco in May, but it remains to be voted on in the special commissions and by the full house.

That bill is a result of recommendations made by lawyers and jurists in a working group created in 2022 that is centered on five key topics for AI: principles, the rights of those affected, risk classification, governance obligations and requirements, and oversight and accountability.

The proposal brings together various bills previously presented in congress in a single regulatory framework for AI.

The initiative also foresees the launch of regulatory sandboxes.

"I do believe some kind of regulation is necessary," Nascimento said in the event. "Companies like Itaú and AWS have a key role in that. But [this regulation] is not a simple answer."

AWS is the bank's main cloud partner, although Itaú now openly admits working with other major [providers](#). Itaú last year completed the migration of its entire data lake to the cloud, said Nascimento.

Overall, the bank has [moved](#) 70% of the total data workloads it had mapped for the AWS cloud.

Itaú invested around 300mn reais (US\$168mn) in business in technology in 1Q23, compared with 400mn reais in the same quarter of last year.

The bank will release its 2Q23 results on Aug 7.

48. [Ethical and responsible use of AI in Argentina worker's rights](#)

On August 24th UNI Global Union and the Banco La Nación Argentina have signed a global agreement that strengthens labour relations and workers' rights throughout the bank's operations. The agreement, announced during the UNI Finance Global Conference, reaffirms policies of inclusion and against discrimination, guarantees the right to form or join a union for all workers, and addresses key issues related to digitalization in the sector.

It covers the banks 17,713 workers, not only in Argentina but also in the United States, Spain, Uruguay, Bolivia, Brazil, Paraguay and China – countries where it operates through branches, agencies, sub-agencies, a customer service centre and a representative office.

Silvina Batakis, President of the National Bank, said that this agreement “provides a real regulatory framework to the world of finance which today is a global and complex world and therefore needs clear operating rules in defence of all bank and insurance workers.”

The agreement establishes standards against sexual and labour harassment as well as support for victims of such harassment, and it also creates a mechanism to for UNI and the bank to address reported breaches of union and labour rights. Also, in terms of digitalization, it promotes social dialogue to help protection against online violence and harassment, the development of digital skills for workers, the ethical and responsible use of artificial intelligence, among other issues.

Christy Hoffman, General Secretary of UNI Global Union, said: “This agreement lays a solid foundation for the application of regulations regarding labour, union, and digital rights to strengthen workplaces, not only in Argentina but in all countries where the National Bank operates.”

UNI Global Union represents more than 20 million service sector workers worldwide. It has signed over 50 global agreements, which secure and enforce the rights of workers, with leading company across various industries which cover more than 14 million workers.

49. [How AI will shape the future of banking](#)

Artificial intelligence is set to revolutionise the financial services industry in the years ahead, says Westpac's chief technology officer David Walker, driving major efficiency gains and allowing for more personalised customer experiences.

“Generative AI, I believe, will be the most disruptive technology innovation since the advent of the personal computer and, more recently, the inception of the internet,” said Walker in his opening address at TECHx23, the bank’s week-long technology expo.

“It’s something that is going to change the way that we all individually and personally interact, and it’s going to be incredibly important for the bank going forward.”

The ninth annual TECHx conference – which brought together almost 5000 attendees across the bank – is an opportunity for staff to learn about tech innovation, hear from industry thought leaders, and connect with colleagues in the community.

The impact AI will have on the industry is likely to evolve across three distinct waves, Walker said.

“We’re at the peak of the first wave – this stage is very much a partnership in making decisions, [AI providing data] that humans have to interpret.”

But that’s just the beginning. In the future, AI will increasingly act on behalf of humans, gaining greater autonomy in decision making and problem solving. Short-term

The finance sector’s immediate focus is on boosting productivity across different processes with artificial intelligence. A recent [study](#) by PWC found that by 2030, generative AI will have helped to increase global GDP by 26 per cent.

Earlier this year, Westpac conducted an in-house experiment to understand whether integrating generative AI would improve productivity and experience for the bank’s engineers.

The experiment found that, when compared to a control group performing tasks solo and manually, software engineers who were aided by generative AI saw a 46 per cent productivity gain.

AI-pair programming, a technique that involves the use of AI to assist a developer in writing code, was found to deliver equal – or better – quality code.

The quality of developers’ experiences significantly improved as well.

“Engineers went from being somewhat sceptical at the beginning, to the point where they are strong advocates for it,” Walker said.

For senior engineers, use of AI removed toil from their work allowing them to focus on more value-added tasks, while junior engineers found it more beneficial from a training and guidance perspective.

Rolled out to over 700 engineers across Westpac over the last 4 months, they are writing 22 per cent more code every day.

Mid-term

The move towards hybrid intelligence, where both human and artificial intelligence can interact with each other, is next on the horizon. This stage will see AI using 'domain-based expertise' – making judgement calls, evaluating inputs, and guiding users, while humans are still in charge.

The opportunity here is to create 'ambient' user experiences – technology systems which will seamlessly and intuitively interact with Westpac's customers and employees, based on the needs and context of their requests.

Creating ambient user experiences involves re-thinking and re-imagining a world beyond mobile banking apps; where conversations, personalised video, and new customer experiences are favoured.

Ambient computing is poised to revolutionise user experiences. It could be the banking app offering customers quick access to withdrawal options and promotions when they are near Westpac ATMs, or a smart home device proactively suggesting allocating funds to savings based on spending patterns when reviewing the user's daily schedule.

"These interfaces and this ability to just converse with technology in a different way, and a more meaningful way, will create these new experiences."

Long-term

As technologies mature, and new services and products are available, autonomous AI will eventually be the norm – representing a shift from AI as a tool, to AI as reasoning machines.

"The third [wave], which is a little bit further out, is this idea of creating a personalised financial concierge capable of looking over our digital shoulder and helping us in our everyday activities, particularly in giving us the advice that we need at the right time," said Walker.

But while autonomous AI can be powerful and meaningful, the prospect of AI acting on our behalf places even more importance on its responsible use, Walker said.

"Responsible AI is a community concern, and collectively we all need to understand how we apply the techniques and technologies to ensure that we adopt AI at scale, but also responsibly," said Walker.

"As AI grows, we need to build in the ethical boundaries, we need to make sure it's transparent, and we also need to make sure it's aligned to our values.

At a time of fast-technological change, it's important that organisations are constantly looking to evolve, Walker said.

"Our goal is to become a future ready organisation at every opportunity."

50. [Embrace, Challenge, Transform: The Future of Digital Banking and Transacting in Africa](#)

Embrace, Challenge, Transform: The Future of Digital Banking and Transacting in Africa

Mpumelelo Makhubu-Mukogo, Head: Digital at Standard Bank Global Markets Digital Solutions

21 August 2023, Johannesburg: Banking in Africa is on the brink of its next transformative era. Gone are the days of discussing the Fourth Industrial Revolution as a concept; we are already immersed in a world augmented and powered by artificial intelligence (AI), Big Data, and cloud computing. Now, the next frontier beckons, with generative AI, secure online watermarked fingerprints and cryptocurrencies taking centre stage.

Africa has demonstrated its propensity for embracing technology, particularly in the financial services sector. With around [8 out of 10 people on the continent owning mobile phones](#) and over [570 million people online](#) in 2022, [up 470% from 2010 \(a significant contrast to the global increase of 159%\)](#), access to information and services has become easier. Now more than ever before, digital access to financial services in Africa is at a ripe stage. However, to further and continue this digital transformation journey, we must solve the existing infrastructure challenges, collaborate more and strengthen institutional connections.

Embrace

To remain relevant, banks and central banks must evolve to embrace and adopt the opportunities presented by new technologies such as blockchain, mobile money and cloud technology. However, new opportunities also come with risks, which require updated regulations that are effective but do not stunt innovation especially those that are being driven by fintechs. Fintechs should not be seen as threats, but as partners that could help established players in meeting the needs of customers.

On a continent where physical cash still accounts for more than 70% of transactions, there is a tremendous opportunity to apply lessons learned from Mobile Money adoption and get more people into the banking economy in a safe and accessible way.

Mobile Money solutions are among the fastest-growing payment methods on the continent, and we can make the next exponential step by leveraging these Mobile Money solutions beyond just payments or peer-to-peer transactions. Africa has a young, digital-native and rapidly urbanising population, the continent is a hotbed of start-ups and fintechs helping solve financial challenges and many countries and territories are easing regulations to speed up technological adoption in banking.

We need to embrace technology as we always have, while learning from the other early adopters to produce the best new-age solutions for our customers. Mobile Money solutions have vast potential to evolve into more complete banking products, including lending, saving and investing – and banks must lead in that charge.

Challenge

There is arguably no market in which the growth of - and demand for - more inclusive and accessible financial services is more prevalent than in Africa. Our rapid commercial growth and

globalisation over the past decade have made more inclusive financial services even more critical. The growth of Small to Medium Enterprises and entrepreneurship in several African countries and accompanying innovation in fintech - particularly blockchain technology – has the potential to drive the improvement of financial infrastructure across the board.

As Standard Bank, we are no strangers to peer-to-peer (P2P) payments, which have been widely used to enable informal and small business ventures at the heart of many African economies by easing the logistics and cost of payments. It no wonder that Africa’s cryptocurrency adoption rate was 1 200% between June 2020 and July 2021, with more than \$100bn worth of cryptocurrency payments made to Africans during that period – the bulk of which were remittances.

Another key area that needs development is efficient and lower-cost cross-border payments to facilitate Intra-Africa trade as well as trade outside of the continent. One solution which seeks to address the Intra-Africa need is the Pan African Payment and Settlement System (PAPSS), which enables cross boarder instant payments across African countries, without the complexity, time and money it takes to make these payments using traditional correspondent banking methods.

With PAPSS, participants do not need to first convert local currency to a hard currency like USD as an expensive, time-consuming intermediary step when making a payment to a participant in another African country. Wide adoption of PAPSS across the continent will revolutionize payments on the continent and contribute towards economic growth. It is for this reason that we as Standard Bank South Africa, have signed a memorandum of understanding to be one of the banks providing settlement of these transactions. We also aim to be a participant bank in most of the markets we operate in.

Several African countries have seen a rapid uptake of cryptocurrencies as a means to access more efficient payment rails provided by blockchain networks and yield returns on income with assets like Bitcoin or Stablecoins, which are designed to maintain stable value through being pegged to an asset such as the US Dollar.

Because of the volatility of cryptocurrencies, the real potential for increased financial inclusion in Africa lies in the blockchain infrastructure that underpins them, rather than in the currencies themselves – Stablecoins aside. The distributed ledger system can instantly eliminate fraud and human error in transactions and foster transparency in financial records, which can enable the creation of corruption-resistant and robust welfare systems. It can also provide mechanisms for fair and transparent microfinance and increased purchasing power, to support the creation and growth of small enterprises that serve communities. Blockchain technology can kickstart new trade opportunities between nation-states and give Africans the opportunity to take part in a technological revolution and form part of the decentralised economy.

At Standard Bank, we are starting to make significant progress in leveraging blockchain and smart contracts via our Aroko payment platform. This end-to-end digital payment solution uses distributed ledger technology, with its smart contract capabilities, to enable businesses to have automatic foreign exchange (FX) payments and settlement. We also provide FX and money markets products to innovators via our world-class application programming interfaces (APIs), where we are able to provide both indicative or executable FX and money market rates through direct integration with customers’ systems.

Transform

Where, then, does that leave traditional banking? It's clear that the answer is not to compete with fintechs nor ignore these 4IR technologies, but rather to complement and use these technologies through participating in our own right, and via partnerships.

Digital Banking solutions which will matter now and, in the future, are those built by not only leveraging emerging technology but through collaboration between traditional incumbent banks, central bank regulators, and fintechs in solving the challenges which inhibit access to financial services in and outside of Africa at true scale.

Ultimately, the aim is to contribute towards sustained economic growth and development in Africa, and we are likely to move towards this faster through partnerships with these start-ups, MNOs and fintechs, which are often more innovative and agile in solution delivery. By layering a culture that supports agility and measured risk-taking on top of a base of sound technologically innovative solutions, we can set alight the true potential of Africa.

51. [The use of generative AI and AI-assisted technologies in writing for Elsevier](#)

The use of generative AI and AI-assisted technologies in writing for Elsevier

Last updated 18 August 2023

Policy for Book and Commissioned Content Authors

This policy aims to provide greater transparency and guidance to authors, readers, reviewers, editors in relation to generative AI and AI-assisted technologies. Elsevier will monitor this development and will adjust or refine this policy when appropriate. Please note the policy only refers to the writing process, and not to the use of AI tools to analyze and draw insights from data as part of the research process.

Where authors use AI and AI-assisted technologies in the writing process, these technologies should only be used to improve readability and language of the work and not to replace key authoring tasks such as producing scientific, pedagogic, or medical insights, drawing scientific conclusions, or providing clinical recommendations. Applying the technology should be done with human oversight and control and all work should be reviewed and edited carefully, because AI can generate authoritative-sounding output that can be incorrect, incomplete, or biased. The authors are ultimately responsible and accountable for the contents of the work.

Authors should disclose in their manuscript the use of AI and AI-assisted technologies and a statement will appear in the published work. Declaring the use of these technologies supports transparency and trust between authors, readers, reviewers, editors, and contributors and facilitates compliance with the terms of use of the relevant tool or technology.

Authors should not list AI and AI-assisted technologies as an author or co-author, nor cite AI as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans. Each (co-) author is accountable for ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved and authorship requires the ability to approve the final version of the work and agree to its submission. Authors are also responsible for ensuring that the work is original, that the stated authors qualify

for authorship, and the work does not infringe third party rights, and should familiarize themselves with [Elsevier's Publishing Ethics policy](#) before they submit.

The use of generative AI and AI-assisted tools in figures, images and artwork

Elsevier does not permit the use of generative AI or AI-assisted tools to create or alter images in submitted manuscripts. This may include enhancing, obscuring, moving, removing, or introducing a specific feature within an image or figure. Adjustments of brightness, contrast, or color balance are acceptable if they do not obscure or eliminate any information present in the original. Image forensics tools or specialized software might be applied to submitted manuscripts to identify suspected image irregularities.

The only exception is if the use of AI or AI-assisted tools is part of the research design or research methods (such as in AI-assisted imaging approaches to generate or interpret the underlying research data, for example in the field of biomedical imaging). If this is done, such use must be described in a reproducible manner in the methods section. This should include an explanation of how the AI or AI-assisted tools were used in the image creation or alteration process, and the name of the model or tool, version and extension numbers, and manufacturer. Authors should adhere to the AI software's specific usage policies and ensure correct content attribution. Where applicable, authors could be asked to provide pre-AI-adjusted versions of images and/or the composite raw images used to create the final submitted versions, for editorial assessment.

The use of generative AI or AI-assisted tools in the production of artwork such as for book or commissioned content covers or graphical abstracts is not permitted.

52. [AI workplace changes](#)

By midyear, all of Morgan Stanley's thousands of wealth advisers are expected to have access to a new artificial-intelligence-powered chat tool.

The tool, which is already in use by about 600 staff members, gives advisers answers to questions such as "Can you compare the investment cases for Apple, IBM and Microsoft?" and follow-ups such as "What are the risks of each of them?" An adviser can ask what to do if a client has a potentially valuable painting — and the knowledge tool might provide a list of steps to follow, along with the name of an internal expert who can help.

"What we're trying to do is make every client or every financial adviser as smart as the most knowledgeable expert on any given topic in real time," said Jeff McMillan, the head of analytics, data and innovation for Morgan Stanley Wealth Management.

Experts disagree about whether A.I. will wind up destroying more jobs than it creates over time. But it is clear that A.I. will alter work for most knowledge workers, shifting the skills they need and changing the staffing needs of most companies. Now it's up to business leaders to figure out how to take advantage of the technologies today, while preparing workers for the disruption that the tools present over the medium term.

Moving too slowly may mean losing out on gains in productivity, customer service and — ultimately — competitiveness, similar to what happened to businesses that didn't embrace the

internet fully or fast enough. But at the same time, leaders must guard against the mistakes and biases A.I. often perpetuates and be thoughtful about what it means for employees.

“Almost no matter which sector you are in, you need to be thinking about your company as becoming an A.I.-first company,” said Alexandra Mousavizadeh, chief executive at [Evident](#), a start-up that analyzes finance companies’ A.I. capabilities.

[53. Guidelines establish proper uses of AI in research](#)

The Ministry of Science and Technology recently issued guidelines on the proper use of artificial intelligence-related content, emphasizing that researchers should integrate ethical requirements into the entire research process.

The Guidelines for Responsible Research Conduct (2023) state that generative AI should not be used to directly generate research application materials, nor should it be listed as a co-author.

They also state that when using AI to generate content, especially when it involves facts and opinions, it should be clearly labeled and the generation process should be explained to ensure accuracy, authenticity and respect for intellectual property rights.

In addition, content generated by AI that has been labeled as such by other authors should generally not be cited as original references. Unverified references generated by AI should not be used directly. The primary methods and details of using AI should be disclosed in the research methods or appendix sections.

During the publication of research outcomes, authors should disclose whether generative AI was used, specify the software name, version and usage time, and provide specific annotations for auxiliary generated content related to facts and opinions, the guideline says.

In the peer review process, if generative AI is to be used, prior consent should be obtained from the organizers of the review activity. Measures should be taken to prevent the leak of review content, and necessary remedial actions should be taken promptly in case of an information leak, according to the guidelines.

The guideline applies to research institutions, universities, medical and health institutions, enterprises, and their researchers. The specified requirements cover the main aspects and processes of scientific and technological activities.

The ministry stated that conducting responsible scientific research is a widely recognized standard in international science and technology governance, and is an essential requirement for promoting the healthy development of China's science and technology industry and achieving high-level technological self-reliance.

54. [China unveils new artificial intelligence guidelines for scientists and bans use in funding applications](#)

The guidelines say AI cannot be credited as a co-author and any use of the technology for research purposes must be clearly labelled

Some scientists welcomed the move, with one saying he feared research students could be ‘ruined’ by misusing the technology

China has published new guidelines on the use of generative [artificial intelligence](#) in scientific research, including a ban on the “direct” use of the technology when applying for research funding and approval.

The Guidelines For Responsible Research Conduct were released by the Ministry of Science and Technology on December 21, with the aim of promoting the “healthy development” of scientific research.

The guidelines cover various aspects of the research process, including topic selection and peer review, with ethics, safety and transparency the main considerations.

The rules apply to individual researchers and institutions, including universities and medical and health centres.

The guidelines set out a general framework for the use of AI, but do not provide detailed rules for specific situations.

One of the main concerns is the use of AI-generated content, which cannot be listed as a co-author under the new rules.

AI has helped researchers around the world make discoveries such as [new antibiotics that may help fight drug-resistant superbugs](#) and a [Chinese team’s AI-generated catalysts that could help produce oxygen on Mars](#).

Some scientists have also listed AI tools such as ChatGPT as co-authors – a practice many journals have already stopped.

However, this has prompted discussions about whether AI should be credited if it discovers new materials or drugs – and even a broader philosophical debate about whether it should be considered equal to humans in the pursuit of knowledge.

Under the guidelines, generative AI can still be used in research, but any content or findings that use the technology must be clearly labelled as such.

Wen Shaoqing, an associate professor at Fudan University in Shanghai, said the effect of the regulations was likely to be “limited”, at least in his field of scientific archaeology, because generative AI “tends to produce poor-quality project application proposals” and few people will use it.

A biologist from the Chinese Academy of Sciences, who asked not to be named, also said she never uses AI to help her write proposals because these language models produce “beautiful but essentially meaningless words”.

However, another researcher from the Chinese Academy of Social Sciences said the widespread use of generative AI “is an irreversible trend” and it is unrealistic and unreasonable to ban it across the board.

The scientist, who also spoke on condition of anonymity, said researchers will continue to use it in research and grant applications if they think it will help them and it is more important to figure out “how to allow researchers to use it in an appropriate way and to ... keep up with international trends”.

The rapid development of AI technology has “promoted profound changes in scientific research paradigms”, according to a document from the science ministry explaining the new rules.

However, it continued that the guidelines were needed because the technology has created problems around authorship, intellectual property and data processing.

According to the ministry, the guidelines draw on “useful foreign experiences and reflect international practices.”

It said the guidelines were based on a “broad consensus” in scientific circles, and will be updated and adjusted based on further technological developments.

Regulating the use of AI became a major focus for Beijing last year, both domestically and internationally.

In April a meeting of the Politburo said it attached “great importance” to developing AI but highlighted the importance of risk prevention.

In August [the country’s first regulations](#) – the Interim Measures for the Management of Generative AI Services – came into effect with the aim of promoting “socialist values” and the “healthy” development of publicly available AI content.

These measures do not apply to scientific research institutes as long as they do not provide generative AI services to the Chinese public, according to the Cyberspace Administration of China.

At the start of November, China along with 27 other countries, including the United States, and the European Union, met in Britain to sign the [Bletchley Declaration, an international pact on regulating the potentially “catastrophic” risks](#) that could arise from rapidly developing AI.

China’s new scientific guidelines expand upon the interim measures. Apart from the ban on the direct use of AI when writing applications, the rules also say that AI-generated content and results must be labelled within the text “especially when it involves key content such as facts and opinions”.

AI-generated content should also be identified in the footnotes, methods section or appendices of research papers, along with explanations of how it was created and what software was used.

Any content that is marked as being generated by AI should not be treated as original literature, and if other authors want to cite this content “an explanation should be given”, the guidelines say.

They also state that any references generated by AI cannot be used unless they are verified first. A library guide from University College London has previously warned that generative AI may fabricate references and quotes.

A scientist from the Chinese Academy of Sciences working in organic chemistry said restrictions on AI-generated content are necessary because many graduate students now use it to write their theses, and he fears “it will ruin these students”.

The scientist, who asked not to be named, believes that such tools can make students lazier and makes it harder for them to develop original thinking skills.

55. [Penguin Random House CEO hopes AI will help sell more books: Report](#)

Penguin Random House CEO Nihar Malaviya said that he hoped AI would make it easier to sell more book titles without hiring more people in the future, reported The New York Times this week. The report was a profile of the chief of Penguin Random House - one of the ‘Big Five’ global publishing companies that employs thousands of professionals and dominates the English-language mainstream publishing sector. The piece noted that Malaviya was focusing on growth, with the company laying off around 60 people last year as well as using voluntary buyouts. Penguin Random House tried to acquire fellow Big Five publisher Simon & Schuster in 2020, but was blocked on antitrust grounds, leading to the deal being dropped around two years later.

(For top technology news of the day, [subscribe](#) to our tech newsletter Today’s Cache)

Publishers in India are also looking at artificial intelligence to help book production. Harper Collins India CEO Ananth Padmanabhan noted last year that AI narrators could bring about quicker releases of translated novels.

While [publishers worldwide explore the use of large language models](#) and the AI tools they power, some readers worry they will be used to make creators redundant or automate book acquisitions in a sector already known for its lack of diversity.

56. [Artificial Intelligence \(AI\) Principles](#)

AI Principles

Privacy and Security

Wolters Kluwer focuses on privacy and security as part of the design, development and deployment of AI in our products and services. We promote the creation of AI systems that are safe, secure and reliable through our processes and procedures.

Transparency and Explainability

Wolters Kluwer aims to design and develop AI systems with sufficient transparency and explainability to enable users to understand and use the system appropriately.

Governance and Accountability

Wolters Kluwer adheres to development standards and processes that promote responsibility and accountability for AI systems and their outcomes. We address risk management and issue remediation during design and development, as well as after deployment.

Fairness

Wolters Kluwer recognizes the importance of treating people fairly and without discrimination in the design and development of AI products and services.

Human Focused

Wolters Kluwer strives to create AI systems that are human-centric, focused on solving business problems and benefiting our customers, while also considering the potential impact they may have on society and our environment.

57. [AI policy](#)

Artificial Intelligence Policy

1% for the Planet Artificial Intelligence Policy

Last updated: July 2023

Purpose

At 1% for the Planet, we recognize the potential benefits of artificial intelligence (AI) for supporting our stakeholders, our staff, and advancing our mission. We are committed to using AI in a responsible, ethical, and effective manner, and to fostering a culture of transparency and accountability in our use of AI tools.

To achieve these goals, we have developed this AI policy to guide our use of AI and ensure that it aligns with our [core values and mission](#). We will regularly review and update this policy to reflect changes in technology, industry standards, and legal and regulatory requirements. We subscribe to the “first draft not final draft” view of content or analyses generated by AI, and will always center our staff and stakeholders when considering the use of AI systems.

We are committed to being open to feedback and making changes as necessary to ensure that our use of AI is responsible, ethical, and mission-aligned. As the world of AI continues to evolve, we will continuously evaluate and improve upon our use of AI to ensure that it meets our high standards for ethical and responsible use.

Ethics & transparency

We will ensure that any AI systems or tools we deploy are guided by ethical principles, including an unwavering commitment to transparency in how we use AI. We will regularly review and update this publicly-available AI policy to reflect the latest ethical standards and best practices.

We will be transparent with our stakeholders about our use of AI. This includes regularly communicating with our stakeholders about the development and use of AI systems, as well as how those systems or tools make decisions and which data they use.

Any content or images generated by AI will always be reviewed and edited by human experts to ensure they are accurate, meet our ethical standards, and do not contain any objectionable or harmful content.

Images generated by AI will be accurately credited. We will respect the work of authors and artists when designing prompts to avoid directly using living artists in prompts.

Content developed with the support AI will utilize the same attribution process we would typically use for both internal and external facing content. For example, we don't typically credit an author for a blog post, as many staff may have contributed to a given piece. When in doubt though, we will over communicate about our use of AI as an assistant in generating content.

Data privacy & security

We will use AI in ways that protect the privacy of individuals and businesses, and the security of their data.

We will ensure that any data we collect or use is handled in accordance with our [existing privacy policy](#), best practices and applicable regulations. Sensitive or personal data will always be anonymized, encrypted, or otherwise protected if used with AI tools.

Preventing discrimination & bias

We will use AI to promote diversity, equity, and inclusion in our global network. We will work to ensure that our AI tools and services are accessible and inclusive for all.

We will prevent and address bias and discrimination in our AI systems by using diverse datasets to build any AI systems, by leaning into diverse input and expert review of AI systems, and by regularly auditing and testing for bias and discrimination.

We recognize that AI tools, and in particular Large Language Model (LLMs) are only as good as the content they are trained on, which means they are subject to the inaccuracies and biases of the training content. These LLMs can also “hallucinate” (i.e. generate factually inaccurate content that may sound correct). As such, we are fully committed to training our staff on appropriate use of LLMs and AI systems, and ensuring human oversight of any published content.

Human oversight & risk mitigation

We will consult with external experts as we develop and deploy any AI systems.

Before deploying any AI system or tool, we will conduct a risk assessment and develop a plan for mitigating and managing those risks.

We will ensure that there is human oversight of any AI systems by training staff on AI risk management, and teaching them how to monitor and regularly review those systems, and intervene when necessary.

As described above, we are committed to expert human review of any content generated with the help of AI systems, prior to sharing or publishing outside of our organization.

Regulatory compliance

We will consult with legal experts to ensure that any AI systems we develop or deploy are in compliance with applicable laws and regulations.

Training & education

We are committed to investing in AI prompt training and education for staff, including training on how to use and interpret AI systems, as well as training on the ethical considerations associated with the use of AI.

Basic AI guidelines will be required in alignment with this policy to ensure staff is trained appropriately. We also will not allow the use of prompts that mimic living creators like artists or authors.

Sustainability

We recognize the importance of minimizing the environmental impact of any AI systems we use or develop. We will account for increased energy consumption as part of our GHG Scope 3 measurement and offsetting practice

Review & updates

This policy will be reviewed annually, or as needed based on changes in technology, regulation, or organizational needs. Updates will be communicated to all users and appropriate training will be provided.

58. [Principles for AI](#)

A first of their kind, these pioneering [Global Principles](#) provide guidance for the development, deployment, and regulation of AI systems and applications to ensure business opportunities and innovation can thrive within an ethical and accountable framework. The Global Principles for AI aim to ensure publishers' continued ability to create and disseminate quality content while facilitating innovation and the responsible development of trustworthy AI systems.

Addressing critical dimensions relating to intellectual property, transparency, accountability, quality and integrity, fairness, safety, design, and sustainable development, the Global Principles on AI mark an unprecedented collaboration that safeguards the interests of content creators, publishers, and consumers alike.

In the Principles, the organizations call for the responsible development and deployment of AI systems and applications, stating that these new tools must only be developed under established principles and laws that protect publishers' intellectual property, brands, consumer relationships, and investments. The Principles state explicitly that AI systems' "indiscriminate misappropriation of our intellectual property is unethical, harmful, and an infringement of our protected rights."

News/Media Alliance President and CEO Danielle Coffey stated, "These Global AI Principles demonstrate the widespread agreement of publishers worldwide that their intellectual property, which is the product of significant investments they have made in providing quality journalistic and creative content, should be recognized and respected. AI systems are only as good as the content they use to train them, and therefore developers of generative AI technology must

recognize and compensate publishers accordingly for the tremendous value their content contributes to the development of these systems.”

Digital Content Next CEO Jason Kint stated, “For decades, our member companies have pursued opportunities to bring trusted news and entertainment to new platforms and new distribution channels enabled by the internet. We know from experience that principles like these are necessary to make certain those opportunities continue to proliferate and serve as a guidepost for businesses and policymakers who are wrestling with the ethical and legal questions surrounding AI.”

Among other things, the Global AI Principles stipulate that developers, operators, and deployers of AI systems should:

Respect intellectual property rights protecting the organizations’ investments in original content.

Leverage efficient licensing models that can facilitate innovation through training of trustworthy and high-quality AI systems.

Provide granular transparency to allow publishers to enforce their rights where their content is included in training datasets.

Clearly attribute content to the original publishers of the content.

Recognise publishers’ invaluable role in generating high-quality content for training, and also for surfacing and synthesizing.

Comply with competition laws and principles and ensure that AI models are not used for anti-competitive purposes.

Promote trusted and reliable sources of information and ensure that AI-generated content is accurate, correct and complete.

Not misrepresent original works.

Respect the privacy of users that interact with them and fully disclose the use of their personal data in AI system design, training, and use.

Align with human values and operate under global laws.

Global AI Principles

Introduction

AI developers and regulators have a unique opportunity to establish an ethical AI framework to boost innovation and create new business opportunities, while ensuring that AI develops in a way that is responsible and sustainable. To achieve this, it is essential that AI systems are trained on content and data which is accessed lawfully, including by appropriate prior authorisations obtained for the use of copyright protected works and other subject matter, and that the content and sources used to train the systems are clearly identified. This document sets out principles that the undersigned publisher organisations believe should govern the development, deployment, and regulation of Artificial Intelligence systems and applications. These principles cover issues related

to intellectual property, transparency, accountability, quality and integrity, fairness, safety, design, and sustainable development.

The proliferation of AI Systems, especially Generative Artificial Intelligence (GAI), present a sea change in how we interact with and deploy technology and creative content. While AI technologies will provide substantial benefits to the public, content creators, businesses, and society at large, they also pose risks for the sustainability of the creative industries, the public's trust in knowledge, journalism, and science, and the health of our democracies.

We, the undersigned organisations, fully embrace the opportunities AI will bring to our sector and call for the responsible development and deployment of AI systems and applications. We strongly believe that these new tools will facilitate innovative breakthroughs when developed in accordance with established principles and laws that protect publishers' intellectual property (IP), valuable brands, trusted consumer relationships, and investments. The indiscriminate appropriation of our intellectual property by AI systems is unethical, harmful, and an infringement of our protected rights.

Our organisations represent thousands of creative professionals around the world, including news, magazine, and book publishers and the academic publishing industry such as learned societies and university presses. Our members invest considerable time and resources creating high-quality content that keeps our communities informed, entertained, and engaged. These principles – applying to the use of our content to train and deploy AI systems, as they are understood and used today – are aimed at ensuring our continued ability to innovate, create and disseminate such content, while facilitating the responsible development of trustworthy AI systems.

Intellectual Property

1) Developers, operators, and deployers of AI systems must respect intellectual property rights, which protect the rights holders' investments in original content. These rights include all applicable copyright, ancillary rights, and other legal protections, as well as contractual restrictions or limitations imposed by rightsholders on the access to and use of their content. Therefore, developers, operators, and deployers of AI systems—as well as legislators, regulators, and other parties involved in drafting laws and policies regulating AI—must respect the value of creators' and owners' proprietary content in order to protect the livelihoods of creators and rightsholders.

2) Publishers are entitled to negotiate for and receive adequate remuneration for use of their IP. AI system developers, operators, and deployers should not be crawling, ingesting, or using our proprietary creative content without express authorisation. Use of intellectual property by AI systems for training, surfacing, or synthesising is usually expressly prohibited in online terms and conditions of the rightsholders, and not covered by pre-existing licensing agreements. Where developers have been permitted to crawl content for one purpose (for example, indexing for search), they must seek express authorisation for use of the IP for other purposes, such as inclusion within LLMs. These agreements should also account for harms that AI systems may cause, or have already caused, to creators, owners, and the public.

3) Copyright and ancillary rights protect content creators and owners from the unlicensed use of their content. Like all other uses of protected works, use of protected works in AI systems is subject to compliance with the relevant laws concerning copyrights, ancillary rights, and permissions within protocols. To ensure that access to content for use in AI systems is lawful, including through

appropriate licenses and permissions obtained from relevant rightsholders, it is essential that rightsholders are able effectively to enforce their rights, and where applicable, require attribution and remuneration.

4) Existing markets for licensing creators' and rightsholders' content should be recognised. Valuing publishers' legitimate IP interests need not impede AI innovation because frameworks already exist to permit use in return for payment, including through licensing. We encourage efficient licensing models that can facilitate training of trustworthy and high-quality AI systems

Transparency

5) AI systems should provide granular transparency to creators, rightsholders, and users. It is essential that strong regulations are put in place to require developers of AI systems to keep detailed records of publisher works and associated metadata, alongside the legal basis on which they were accessed, and to make this information available to the extent necessary for publishers to enforce their rights where their content is included in training datasets. The obligation to keep accurate records should go back to the start of the AI development to provide a full chain of use regardless of the jurisdiction in which the training or testing may have taken place. Failure to keep detailed records should give rise to a presumption of use of the data in question. When datasets or applications developed by non-profit, research, or educational third parties are used to power commercial AI systems, this must be clearly disclosed so that publishers can enforce their rights. Where developers use AI tools as a component into the process of generating knowledge from knowledge, there should be transparency on the application of these tools, including appropriate and clear accountability and provenance mechanisms, as well as clear attribution where appropriate in accordance with the terms and conditions of the publishers of the original content. Without limiting and subject to paragraphs 6 and 9, AI developers should work with publishers to develop mutually acceptable attribution and navigation standards and formats. Users should also be provided with comprehensible information about how such systems operate to make judgments about system and output quality and trustworthiness.

Accountability

6) Providers and deployers of AI systems should cooperate to ensure accountability for system outputs. AI systems pose risks for competition and public trust in the quality and accuracy of informational and scientific content. This can be compounded by AI systems generating content that improperly attributes false information to publishers. Deployers of AI systems providing informational or scientific content should provide all essential and relevant information to ensure accountability and should not be shielded from liability for their outputs, including through limited liability regimes and safe harbours.

Quality and Integrity

7) Ensuring quality and integrity is fundamental to establishing trust in the application of AI tools and services. These values should be at the heart of the AI lifecycle, from the design and building of algorithms, to inputs used to train AI tools and services, to those used in the practical application of AI. A fundamental principle of computing is that a process can only be as good or unbiased as the input used to teach the system (rubbish-in-rubbish-out). AI developers and deployers should recognise that publishers are an invaluable part of their supply chain, generating high-quality

content for training, and also for surfacing and synthesising. Use of high-quality content upstream will contribute to high-quality outputs for downstream users.

Fairness

8) AI systems should not create, or risk creating, unfair market or competition outcomes. AI systems should be designed, trained, deployed, and used in a way that is compliant with the law, including competition laws and principles. Developers and deployers should also be required to ensure that AI models are not used for anti-competitive purposes. The deployment of AI systems by very large online platforms must not be used to entrench their market power, facilitate abuses of dominance, or exclude rivals from the marketplace. Platforms must adhere to the concept of non-discrimination when it comes to publishers exercising their right to choose how their content is used.

Safety

9) AI systems should be trustworthy. AI systems and models should be designed to promote trusted and reliable sources of information produced according to the same professional standards that apply to publishers and media companies. AI developers and deployers must use best efforts to ensure that AI generated content is accurate, correct and complete. Importantly, AI systems must ensure that original works are not misrepresented. This is necessary to preserve the value and integrity of original works, and to maintain public trust.

10) AI systems should be safe and address privacy risks. AI systems and models in particular should be designed to respect the privacy of users who interact with them. Collection and use of personal data in AI system design, training, and use should be lawful with full disclosure to users in an easily understandable manner. Systems should not reinforce biases or facilitate discrimination.

By Design

11) These principles should be incorporated by design into all AI systems, including general purpose AI systems, foundation models, and GAI systems. They should be significant elements of the design, and not considered as an afterthought or a minor concern to be addressed when convenient or when a third party brings a claim.

Sustainable Development

12) The multi-disciplinary nature of AI systems ideally positions them to address areas of global concern. AI systems bear the promise to benefit all humans, including future generations, but only to the extent they are aligned to human values and operate in accordance with global laws. Long-term funding and other incentives for suppliers of high-quality input data can help to align systems with societal aims and extract the most important, up-to-date, and actionable knowledge.

59. [AI and International security](#)

NATIONAL SECURITY-RELATED APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Introduction There are a number of direct applications of AI relevant for national security purposes, both in the United States and elsewhere. Kevin Kelly notes that in the private sector “the

business plans of the next 10,000 startups are easy to forecast: Take X and add AI.”¹ There is similarly a broad range of applications for AI in national security. Included below are some examples in cybersecurity, information security, economic and financial tools of statecraft, defense, intelligence, homeland security, diplomacy, and development. This is not intended as a comprehensive list of all possible uses of AI in these fields. Rather, these are merely intended as illustrative examples to help those in the national security community begin to think through some uses of this evolving technology. (The next section covers how broader AI-driven economic and societal changes could affect international security.)

Cybersecurity The cyber domain represents a prominent potential usage arena for AI, something senior leaders have expressed in recent years. In October 2016, National Security Agency (NSA) Director Michael Rogers stated that the agency sees AI as “foundational to the future of cybersecurity.” Rogers’ remarks occurred only two months after DARPA held its first Cyber Grand Challenge, a head-to-head fight between autonomous machines in cyberspace. Each system was capable of automatically discovering and exploiting cyber vulnerabilities in its opponents while patching its own vulnerabilities and defending itself from external cyberattacks.² Impressed with the tournament’s results, DoD began a new program, Project Voltron, to develop and deploy autonomous cybersecurity systems to scan and patch vulnerabilities throughout the U.S. military.³ Even as DoD has begun to implement this technology, potential applications of AI for cybersecurity continue to evolve. The systems in the first Cyber Grand Challenge used rulebased programming and did not make significant use of machine learning. Were a similar competition to be held today, machine learning would likely play a much larger role. Below are several illustrative applications of machine learning in the cybersecurity domain that could be especially impactful for the international security environment.

Increased Automation and Reduced Labor Requirements Cyber surveillance has tended to be less labor-intensive than the traditional human surveillance methods that it has augmented or replaced. The increased use of machine learning could accelerate this trend, potentially putting sophisticated cyber capabilities that would normally require large corporation or nation-state level resources within the reach of smaller organizations or even individuals.⁴ Already there are countless examples of relatively unsophisticated programmers, so-called “script kiddies,” who are not skilled enough to develop their own cyber-attack programs but can effectively mix, match, and execute code developed by others. Narrow AI will increase the capabilities available to such actors, lowering the bar for attacks by individuals and non-state groups and increasing the scale of potential attacks for all actors. Using AI to Discover New Cyber Vulnerabilities and Attack Vectors Researchers at Microsoft⁵ and Pacific Northwest National Laboratory⁶ have already demonstrated a technique for using neural networks and generative adversarial networks to automatically produce malicious inputs and determine which inputs are most likely to lead to the discovery of security vulnerabilities. Traditionally, such inputs are tested simply by randomly modifying (aka “fuzzing”) non-malicious inputs, which makes determining those that are most likely to result in new vulnerability discovery inefficient and labor-intensive. The machine learning approach allows the system to learn from prior experience in order to predict which locations in files are most likely to be susceptible to different types of fuzzing mutations, and hence malicious inputs. This approach will be useful in both cyber defense (detecting and protecting) and cyber offense (detecting and exploiting). Automated Red-teaming and Software Verification and Validation While there is understandable attention given to new vulnerability discovery, many cyber attacks exploit older, well-known vulnerabilities that system designers have simply failed to secure. SQL-injection, for example, is a decades-old attack technique to which many new software systems still fall prey. AI technology could be used to develop new verification and validation

systems that can automatically test software for known cyber vulnerabilities before the new software is operationally deployed. DARPA has several promising research projects seeking to utilize AI for this function. Automated Customized Social Engineering Attacks Many major cybersecurity failures began with “social engineering,” wherein the attacker manipulates a user into compromising their own security. Email phishing to trick users into revealing their passwords is a well-known example. The most effective phishing attacks are human-customized to target the specific victim (aka spear-phishing attacks) – for instance, by impersonating their coworkers, family members, or specific online services that they use. AI technology offers the potential to automate this target customization, matching targeting data to the phishing message and thereby increasing the effectiveness of social engineering attacks.⁷ Moreover, AI systems with the ability to create realistic, low-cost audio and video forgeries (discussed more below) will expand the phishing attack space from email to other communication domains, such as phone calls and video conferencing.⁸ Information Security The role of AI in the shifting threat landscape has serious implications for information security, reflecting the broader impact of AI, through bots and related systems in the information age. AI’s use can both exacerbate and mitigate the effects of disinformation within an evolving information ecosystem. Similar to the role of AI in cyber attacks, AI provides mechanisms to narrowly tailor propaganda to a targeted audience, as well as 5 5 increase its dissemination at scale – heightening its efficacy and reach. Alternatively, natural language understanding and other forms of machine learning can train computer models to detect and filter propaganda content and its amplifiers. Yet too often the ability to create and spread disinformation outpaces AI-driven tools that detect it. Targeted Propaganda and Deep Fakes Computational propaganda inordinately affects the current information ecosystem and its distinct vulnerabilities. This ecosystem is characterized by social media’s low barriers to entry, which allow anonymous actors – sometimes automated – to spread false, misleading or hyper-partisan content with little accountability. Bots that amplify this content at scale, tailored messaging or ads that enforce existing biases, and algorithms that promote incendiary content to encourage clicks point to implicit vulnerabilities in this landscape.⁹ MIT researchers’ 2018 finding that “falsehood [diffuses] significantly farther, faster, deeper and more broadly” than truth on Twitter, especially regarding political news, further illustrates the risks of a crowded information environment.¹⁰ AI is playing an increasingly relevant role in the information ecosystem by enabling propaganda to be more efficient, scalable, and widespread.¹¹ A sample of AI-driven techniques and principles to target and distribute propaganda and disinformation includes:

- Exploitation of behavioral data – The application of AI to target specific audiences builds on behavioral data collection, with machine learning parsing through an increasing amount of data. Metadata generated by users of online platforms – often to paint a picture of consumer behavior for targeted advertising – can be exploited for propaganda purposes as well.¹² For instance, Cambridge Analytica’s “psychographic” micro-targeting based off of Facebook data used online footprints and personality assessments to tailor messages and content to individual users.¹³
- Pattern recognition and prediction – AI systems’ ability to recognize patterns and calculate the probability of future events, when applied to human behavior analysis, can reinforce echo chambers and confirmation bias.¹⁴ Machine learning algorithms on social media platforms prioritize content that users are already expected to favor and produce messages targeted at those already susceptible to them.¹⁵
- Amplification and agenda setting – Studies indicate that bots made up over 50 percent of all online traffic in 2016.¹⁶ Entities that artificially promote content can manipulate the “agenda setting” principle, which dictates that the more often people see certain content, the more they think it is important.¹⁷ Amplification can increase the perception of significance in the public mind. Further,

if political bots are “written to learn from and mimic real people,” according to computational propaganda researchers Samuel Woolley and Philip Howard, then they stand to influence the debate. For example, Woolley and Howard point toward the deployment of political bots that interact with users and attack political candidates, weigh in on activists’ behavior, inflate candidates’ follower numbers, or retweet specific candidates’ messaging, as if they were humans.¹⁸ Amplifying damaging or 6 6 distracting stories about a political candidate via “troll farms” can also change what information reaches the public. This can affect political discussions, especially when coupled with anonymity that reduces attribution (and therefore accountability) to imitate legitimate human discourse.¹⁹

- Natural language processing to target sentiment – Advances in natural language processing can leverage sentiment analysis to target specific ideological audiences.”²⁰ Google’s offer of political interest ad targeting for both “left-leaning” and “right-leaning” users for the first time in 2016 is a step in this direction.²¹ By using a systemic method to identify, examine, and interpret emotional content within text, natural language processing can be wielded as a propaganda tool. Clarifying semantic interpretations of language for machines to act upon can aid in the construct of more emotionally relevant propaganda.²² Further, quantifying user reactions by gathering impressions can refine this propaganda by assessing and recalibrating methodologies for maximum impact. Private sector companies are already attempting to quantify this behavior tracking data in order to vector future microtargeting efforts for advertisers on their platforms. These efforts are inherently dual-use – instead of utilizing metadata to supply users with targeted ads, malicious actors can supply them with tailored propaganda instead.
- Deep fakes – AI systems are capable of generating realistic-sounding synthetic voice recordings of any individual for whom there is a sufficiently large voice training dataset.²³ The same is increasingly true for video.²⁴ As of this writing, “deep fake” forged audio and video looks and sounds noticeably wrong even to untrained individuals. However, at the pace these technologies are making progress, they are likely less than five years away from being able to fool the untrained ear and eye. Countering Disinformation While no technical solution will fully counter the impact of disinformation on international security, AI can help mitigate its efficiency. AI tools to detect, analyze, and disrupt disinformation weed out nefarious content and block bots. Some AI-focused mitigation tools and examples include:
 - Automated Vetting and Fake News Detection – Companies are partnering with and creating discrete organizations with the specific goal of increasing the ability to filter out fake news and reinforce known facts using AI. In 2017, Google announced a new partnership with the International Fact-Checking Network at The Poynter Institute, and MIT’s the Fake News Challenge resulted in an algorithm with an 80 percent success rate.²⁵ Entities like AdVerif.ai scan and detect “problematic” content by augmenting manual review with natural language processing and deep learning.²⁶ Natural language understanding to train machines to find nefarious content using semantic text analysis could also improve these initiatives, especially in the private sector.
- Trollbot Detection and Blocking – Estimates indicate the bot population ranges between 9 percent and 15 percent on Twitter and is increasing in sophistication. Machine learning models like the Botometer API, a feature-based classification system for Twitter, offer an AI-driven approach to identify them for potential removal.²⁷ Reducing the amount of bots would de-clutter the information ecosystem, as some political bots are created solely to amplify disinformation, propaganda, and “fake news.”²⁸ Additionally, eliminating specific bots would reduce their malign uses, such as for distributed denial-of-service attacks, like those propagated by impersonator bots throughout 2016.²⁹
- Verification of Authenticity – Digital distributed ledgers and machine speed sensor fusion to certify real-time information and authenticity of images and videos can also help weed out

doctored data. Additionally, blockchain technologies are being utilized at non-profits like PUBLIQ, which encrypts each story and distributes it over a peer-to-peer network to attempt to increase information reliability.³⁰ Content filtering often requires judgement calls due to varying perceptions of truth and the reliability of information. Thus, it is difficult to create a universal filter based on purely technical means, and it is essential to keep a human in the loop during AI-driven content identification. Technical tools can limit and slow disinformation, not eradicate it. Economic and Financial Tools of Statecraft Illicit funds course through the global financial system and support terrorism, money laundering, and WMD proliferation. To counter these flows, U.S. officials have expanded the global network of anti-money laundering and counterterrorist financing tools since 9/11. Yet the United Nations estimates that law enforcement only seizes 1 percent of criminal funds.³¹ One potential national security application of AI tools is their use to strengthen counter-illicit-financing operations. By analyzing and learning from large sets of data, AI could accomplish tasks not possible in a human-centered counter-illicit-financing system. AI's anomaly detection and pattern recognition capabilities could help a system learn from the unstructured data collected by financial institutions. In one case, a regulatory technology company integrating AI tools found a correlation between users who had changed their browser language and a type of fraud.³² This analysis uncovered a metric not traditionally used by financial investigators and expanded the definition of usable data. Better pattern recognition will also sort information more usefully. Better sorting can reduce false positives that would otherwise result in alerts. For example, AI could reduce false positives in "high-risk" jurisdictions by replacing an imprecise geographic input with a more effective red flag. Fewer alerts will save time and manpower. Even short of large-scale pattern analysis, AI can improve the counter-illicit-financing framework. Automation could ensure sustained attention to illicit financing threats, even when not prioritized by financial institutions. This feature would allow constant pressure on potential dangers. It would also reduce stress on financial institutions. Banks would no longer have to shift their attention to respond to changing government priorities – for example, from Iran to North Korea. Automation could also integrate available non-financial information about entities and individuals. Today, a significant amount of publicly accessible information is not automatically part of investigations. Through image recognition, AI programs could use open-source social media information that currently does not inform counter-illicit-financing processes.³³ Changes made to a customer's social media presence or networks mapped out through publicly available images could clarify a customer's risk profile.³⁴ AI capabilities could address the counter-illicit-financing framework's major challenges. First, AI could improve efficiency. Human-centered counter-illicit-financing processes generate false positives that detract from investigations and allow threats to go undiscovered or uninvestigated. One study found that 80 to 90 percent of suspicious activity reporting yielded no value.³⁵ Fewer false positives, through better pattern recognition and data segmentation, will save time and money. The savings of time and money that AI systems could enable would be particularly important in combating illicit financial flows. Since 9/11, governments have enlisted financial institutions as partners in the fight against illicit finance. Banks have shouldered increasing compliance costs to keep up with growing regulatory requirements, including to counter illicit finance. Between 2011 and 2017, the cost of compliance has increased by over 20 percent for most banks.³⁶ Lower costs will ensure banks' continued cooperation. Lower costs will also allow smaller, regional banks in high-risk jurisdictions to conduct compliance work that currently only large multinational institutions can afford. Greater participation from smaller banks will reduce vulnerable entry points into the global financial system. AI could also help governments and financial institutions address data privacy and

protection problems. Currently, privacy laws hamper efforts to make the most of collected information. In some cases, financial institutions can struggle even to share information among their own branches in different jurisdictions.³⁷ These limitations create barriers to integrating information and, more importantly, to learning from past typologies of illicit financing. Dr. Gary Shiffman, CEO of Giant Oak, a data science company that uses algorithms to understand large quantities of data, argues that AI could circumvent this problem. An AI system could learn from analyzing a dataset in one jurisdiction. The system could then move its algorithms to other jurisdictions and learn from a new dataset without moving the underlying data itself.³⁸ Privacy limitations would no longer hamper the learning. Though AI could incrementally improve the counter-illicit-financing framework, it could also fundamentally disrupt it. Financial institutions often use static rules to counter illicit funding. For example, a transaction over \$10,000 will trigger a currency transaction report. Rogue players, however, can adapt faster than the rules can evolve. For this reason, international standard-setters like the Financial Action Task Force (FATF) urge financial institutions to use risk-based systems that proactively adapt to and mitigate risk. Because ^{9 9} this approach is costly and time-intensive, FATF requires risk-based measures to tackle money laundering and terrorist financing, but not for the financing of proliferation. An AI-based system, constantly learning and incorporating new information, will allow the expansion of risk-based programs to create a more dynamic counter-illicit-finance program across threat categories.³⁹ An AI system, for example, could spot the patterns used by individuals to evade the \$10,000 limit, connect these illicit networks, and potentially block the wires from leaving banks before transferred amounts become too big.⁴⁰ This section has focused on applying AI to flows of finance rather than the infrastructure and markets supporting these flows. The “flash crash” has shown the susceptibility of programmed trading mechanisms to negative interactions and the currently insufficient preparation for this threat.⁴¹ Opponents could use AI to manipulate markets or destabilize currencies. This category of threats, however, falls outside the traditional realm of economic statecraft. Instead, it would be analogous to a malicious cyber attack. Making the most of financial data will be particularly important going forward. As more and more communication becomes encrypted, financial records will become more important sources of data for investigations and intelligence work. However, the tools to use the data have not yet evolved accordingly. AI offers a way forward. Defense Militaries around the globe are already incorporating more robotics and autonomous systems into their forces, a trend that has been the focus of prior CNAS work. Artificial intelligence and machine learning will allow these systems to tackle more challenging tasks in a wider range of environments. Because of the ubiquitous nature of AI technology, nonstate groups and individuals will also be able to harness and use this technology. In combat operations, robots, swarms, and autonomous systems have the potential to increase the pace of combat. This is particularly the case for domains of machine-to-machine interaction, such as in cyberspace or the electromagnetic spectrum. AI could be used not only to create more intelligent robotics, but also to power more advanced sensors, communications, and other key enablers. • Situational awareness: Small robotic sensors could be used to collect information, and AI-enabled sensors and processing could help make better sense of that information. Deep neural networks already are being used for image classification for drone video feeds as part of the Defense Department’s Project Maven, in order to help humans process the large volumes of data being collected. While current AI methods lack the ability to translate this into an understanding of the broader context, AI systems could be used to fuse data from multiple intelligence sources and cue humans to items of interest. AI systems also could be used to generate tailored spoofing attacks to counter such sensors and processors. 10 10 • Electromagnetic spectrum

dominance: AI systems could be used to generate novel methods of jamming and communications through self-play, akin to AlphaGo Zero improving its game by playing itself. For example, one AI system could try to send signals through a contested electromagnetic environment while another system attempts to jam the signal. Through these adversarial approaches, both systems could learn and improve. DARPA held a Spectrum Challenge in 2014 with human players competing to send radio signals in a contested environment.⁴² DARPA is now using machine learning to aid in radio spectrum allocation,⁴³ but this concept also could be applied to jamming and creating jam-resistant signals.

- Decoys and camouflage: Generative adversarial networks could be used to create militarily relevant deep fakes for camouflage and decoys, and small robotic systems could be used as expendable decoys. As militaries incorporate more AI-enabled sensors for data classification, spoofing attacks against such systems will be increasingly relevant as well.
- Tactics: Evolutionary and reinforcement learning methods could be used to generate new tactics in simulated environments, coming up with surprising solutions as they have in other settings.
- Command and control: As the pace of battle accelerates and the volume and speed of information eclipses the ability of human warfighters, AI will become increasingly important for command and control. Autonomous systems that have been delegated authority for certain actions can react at machine speed at the battlefield's edge without waiting for human approval. AI can also help commanders process information faster, allowing them to better understand a rapidly changing battlespace. Through automation, commanders can then relay their orders to their forces – human or machine – faster and more precisely. AI systems can also aid militaries in a range of non-combat support functions. One use of AI will be to help defense leaders better understand their own forces. By analyzing large amounts of data, AI systems may be able to predict stress on the force in various components: when equipment requires maintenance; when programs are likely to face cost overruns or schedule delays; and when servicemembers are likely to suffer degraded performance or physical or psychological injuries. Overall, AI has tremendous potential to help defense leaders improve the readiness of their own forces by assembling and fusing data and doing predictive analysis so that problems can be addressed before they become critical. AI also is ripe for transforming traditional business processes within military and other government organizations. The U.S. Defense Department, for example, conducts a range of non-military specific business functions, including accounting, travel, medicine, logistics, and other administrative functions. Many of these functions are ripe for automation because they involve routine cognitive or physical labor. In many cases, military organizations may be able to directly import mature and proven technologies from the 11 11 commercial sector that can improve efficiencies and reduce personnel costs, such as more automated accounting systems or AI tools in health care. Defense organizations could save substantial sums of money by drawing on these commercial technologies and streamlining their organizations. Overall, artificial intelligence can help militaries improve understanding, predict behavior, develop novel solutions to problems, and execute tasks. Some applications, such as the use of AI to enable autonomous weapons, raise difficult legal, ethical, operational, and strategic questions. The potential for automation to increase the pace of combat operations to the point where humans have less control over the conduct of war raises profound questions about humanity's relationship with war, and even the nature of war itself. Intelligence AI has many uses in intelligence collection and analysis. For collection, the explosion of data that is occurring because of smart devices, the Internet of Things, and human internet activity is a tremendous source of potential information. This information would be impossible for humans to manually process and understand, but AI tools can help analyze connections between data, flag suspicious activity, spot trends, fuse disparate elements of data, map networks, and predict future

behavior. This could make clandestine activity more challenging in a number of ways, as the combination of big data, data breaches, and increased open source information could make it more difficult to keep intelligence professionals undercover. For example, facial recognition and biometrics, combined with large surveillance systems, could make operating under aliases increasingly difficult. At the same time, AI systems may be vulnerable to counter-AI spoofing techniques, such as fooling images, which will have implications for the intelligence community. Deep fakes and the automation of data creation at scale may make it possible to create deep backstories for individuals undercover. AI may even transform verification of human reporting through improvements in systems that can correlate brain imaging to thoughts, with major implications for counter-intelligence and interrogation.⁴⁴ AI also has tremendous potential value in intelligence analysis. AI systems can be used to track and analyze large amounts of data – including open-source data – at scale, looking for indications and warning of suspicious activity. Anomaly detection can help find terrorists, clandestine agents, or indications and warning of potential enemy military activity. AI-based speech-to-text and translation services could greatly increase the scale of processing audio, video, and text-based foreign language information. AI systems could be used to generate simple automated reports, as they do already for some sports games.⁴⁵ AI systems generally perform poorly at reading comprehension, but as they improve they could be used increasingly to write summaries of transcripts, making it easier for human analysts to quickly sift through the ever-growing volumes of information.⁴⁶ AI systems also could be increasingly valuable in doing semantic analyses of reports that help link disparate pieces of data that humans might miss. AI systems lack the common-sense reasoning that would allow them to make sense of information, but their ability to operate 24/7 with precision at scale will aid human analysts in sorting through massive volumes of information. AI systems will not replace human intelligence analysts, but can aid them by offloading routine tasks and processing data at scale, allowing human analysts to focus on understanding adversaries. Homeland Security AI can also aid a variety of border security and homeland security applications. AI-driven perception, processing, and analysis will be essential for collecting, sorting, and interpreting data to better inform human decision-making. The U.S. Department of Homeland Security (DHS) has already started to adopt and implement some of these technological advancements. Examples of past and current AI-driven DHS initiatives include:

- Voice recognition algorithms – The U.S. Coast Guard has used artificial intelligence to analyze voices to build out their physical appearances. This has helped forensically address false distress signals.⁴⁷
- Open source data for machine learning – In conjunction with Alphabet Inc.’s Kaggle platform, DHS made data from the Transportation Security Administration available to develop better algorithms to evaluate passenger luggage for illicit and dangerous items.⁴⁸
- Understanding data – The Assistant for Understanding Data through Reasoning, Extraction, and Synthesis (AUDREY) AI platform developed by DHS and NASA’s Jet Propulsion Laboratory integrates real-time data to make recommendations to firefighters on how to best function as a team.⁴⁹

AI also has broad applicability in a variety of homeland security functions, such as border security.⁵⁰ Since the U.S. government cannot be stationed at every mile or inspect every container, AI systems, potentially in combination with UAVs and ground robotics, can aid in monitoring borders through advances in automated surveillance and anomaly detection. Systems that monitor human emotional expression and behavior could aid in recognizing humans that appear nervous or are acting oddly, serving as a “sixth sense” at border crossings. AI systems used for game theory/risk assessment also could be valuable in determining where best to apply scarce resources and how to counter adaptive adversaries, such as drug traffickers. Indeed, such systems already are being used to improve

security against poachers in Africa.⁵¹ Diplomacy and Humanitarian Missions Advances in artificial intelligence could also reshape the practice of diplomacy. AI technologies in image recognition and information sorting can make diplomatic compounds safer by monitoring personnel and identifying anomalies for potential vulnerabilities. In addition, language processing algorithms will lower language barriers between countries, allowing them to communicate to foreign governments and publics more easily. More theoretical technologies like political forecasting also remain an option, mining an increasing array of available data to better understand and predict political, economic, and social trends.⁵² However, diplomacy will not be without disruptive challenges. Humans, for the foreseeable future, remain the decision-makers and must properly use the outputs provided by AI technologies. More alarmingly, as efforts to forge testimonies and propagate disinformation abroad are made easier, AI technologies will have to be applied defensively to react to, correct, or even remove malicious content.⁵³ International humanitarian operations could also benefit greatly from AI technologies. AI technologies can help monitor elections, assist in peacekeeping operations, and ensure financial aid disbursements are not misused through anomaly detection. Of course, artificial intelligence can also help directly improve the quality of life in less developed nations by increasing productivity, health care, and myriad other economic benefits.⁵⁴ Artificial intelligence could also help in avoiding disasters that lead to international intervention. For example, AI technologies that extract significant actionable warning signs from climate and soil patterns will be a boon in agricultural efficiency and disaster preparedness.⁵⁵ Implications As an enabling technology, AI has many uses across a variety of national security settings. The United States should expand upon nascent efforts within different parts of the government and establish a whole-of-government initiative to harness and rapidly integrate AI tools within government operations. Because many current AI approaches have significant vulnerabilities, the United States should include safety and robustness against adversarial manipulation as key elements of its effort to incorporate AI technology, and employ “red teams” to test AI tools before they are deployed. The ubiquitous nature of AI technology means that the United States will have to move quickly to keep ahead of potential competitors.

14
14 THE INDIRECT EFFECTS OF THE ARTIFICIAL INTELLIGENCE REVOLUTION FOR GLOBAL SECURITY How might AI generate political and societal change relevant for the international security environment beyond direct national security implications? Given the integral link between economic and military power, especially over the medium to long run, understanding how AI innovations will shape the global economy, the information environment, and societies around the world is crucial. Economic Power and the Future of Work The clearest connections between AI, the global economy, and economic power are through the effect of AI on the ability of countries and businesses to accumulate capital and the consequences for the future of work. The question is whether the consequences of AI will match, or even exceed, previous large-scale shifts in the economy. For example, in 1820 71 percent of Americans reportedly worked in farming occupations. However, the percentage of Americans working in farming declined significantly over the next century due to industrialization, falling to 30 percent in 1920 and 1 percent by 1988.⁵⁶ There has been a large range of predictions on the way that AI will shape the labor market, and those predictions have a large degree of uncertainty. For example, a recent report by the McKinsey Global Institute suggests that nearly half of current job tasks across industries are automatable, while in six out of ten jobs more than 30 percent of the job tasks are automatable. The midpoint estimate of number of jobs displaced by 2030, according to McKinsey, is 400 million, while the high-end estimate is twice as high – 800 million.⁵⁷ These enormous totals, and the wide spread between them, reflect not just the notion that AI will have significant consequences

on the labor market, but that those consequences are difficult to predict. Researchers' estimates on the effect of automation vary significantly. Research by Carl Benedict Frey and Michael A. Osborne at Oxford University suggests that 47 percent of U.S. workers might be at risk from automation by about 2030.⁵⁸ Another report examining 32 developed countries in the Organisation for Economic Cooperation and Development argues that 14 percent of jobs are at a high risk of automation and another 32 percent of jobs are at significant risk.⁵⁹ Meanwhile, a U.S. labor market model by Daron Acemoglu and Pascual Restrepo at the National Bureau of Economic Research, based on data on industrial robotics from 1990–2007, suggests adding “one more robot in a commuting zone reduces employment by 6.2 workers.”⁶⁰ A Forrester research report, in contrast, argues that only 24.7 million jobs will be displaced by 2027, with 14 million created.⁶¹ And even McKinsey says that only about 5 percent of jobs as they exist today could be fully automated.⁶² However, this is not just a question of how many jobs are displaced versus created, but whether those displaced will be able to find work in the new economy. The process of creative destruction can have significant political consequences even if the macro economic effects are relatively stable.⁶³ Former Secretary of the Treasury Larry Summers argued in 2017 that automation pressures, in combination with the difficulty of generating new skills for labor force participation later in life, could result in “a third of men between the ages of 25 and 54 not working by the end of this half century.”⁶⁴ The challenge is that the number of jobs created by the cutting-edge companies of today, at the outset of the AI revolution, is already much smaller than the number of jobs created by the leading companies of previous generations. For example, in 2017 Facebook employed a little over 25,000 people, the largest it has ever been. Meanwhile, Ford Motor Company, with a fraction of the size of its peak labor force, still employed 202,000 workers in 2017.⁶⁵ The risk is that the optimal economic future for growth is more of a “labor-light economy,” as Erik Brynjolfsson and Andrew McAfee argue, where capital generates continuing productivity gains, but workers don't benefit.⁶⁶ And workers, in this scenario, would not be just factory workers. They would be lawyers, doctors, investment bankers, and others that currently have middle class, upper middle class, or upper class incomes. All of those jobs have repetitive tasks, no matter how skilled, that narrow autonomous systems may be able to master. In this scenario, workers who perform repetitive physical and cognitive labor become less valued. Even if unemployment is low, reduced wages can be the effect. In fact, Brynjolfsson and McAfee argue that automation has been responsible for stagnant or falling real wages for the median American worker for the past several decades.⁶⁷ Eras with this level of disruption can have significant indirect implications for the balance of power and the security environment. A change in the underlying basis of the economy can lead to industry shifts that benefit some countries at the expense of others. For example, the First Industrial Revolution helped fuel the rise of the United States – the geography of the United States enabled industrialization on a scale that was difficult to achieve in Europe. Government policy to capitalize on these changes can lead to longlasting shifts in the relative balance of power. The ability of the British government to establish modern financing, in terms of government borrowing and bond markets, enabled Great Britain's creation of the most powerful navy in the world in the late 19th century.⁶⁸ Political and Social Disruption Economic disruption can also fuel social and political disruption. Large numbers of formerly employed workers, or even just groups that are newly disadvantaged due to economic circumstances, are a recipe for political protest and agitation. Maintaining stability requires a level of political dexterity and bureaucratic competence that can be difficult to achieve at the best of times – and periods of economic instability are hardly the best of times. This is one of the mechanisms through which economic transitions can lead to political conflict that, in the worst

case, can make domestic unrest, insurgencies, civil wars, nationalism, xenophobia, and a turn to authoritarianism more likely. The instability generated by automation is already a potential driving force in the rise of populist nationalist movements around the world. As powerful interest groups such as coal workers experience significant decline, they become ever more radical in their desire to see change to return to an old status quo that is impossible to achieve. This can drive political polarization. A disparity in how automation affects different demographic groups could conceivably drive internal political conflict. To better understand how automation would affect American workers, the authors compared the analysis done by the McKinsey Global Institute on the effects of automation by sector⁶⁹ to the age of workers in each sector, as identified by the Bureau of Labor Statistics.⁷⁰ Figure 1 below shows the results.⁷¹ The results suggest that automation is likely to hit younger workers the hardest in the United States. This is not surprising, as younger workers are the most likely to be performing routine tasks that are easily automatable. This is particularly true for workers aged 16–19 and 20–24, who are less likely to be highly educated. Worker wages sharply decoupled by education level in the 1980s, with inflation-adjusted wages for those with a college or post-graduate degree rising and wages for high school graduates and dropouts falling.⁷² This suggests that one effect of the automation economy will be to magnify the impact of education even more – even of specific majors or disciplines that help prepare people for the jobs of the future. From the standpoint of managing the consequences of creative destruction, the silver lining is that the workers hardest hit by automation are those who are youngest and have the most time to gain an education and adapt. One risk, however, is that younger workers who rely on entry-level jobs to pay their way through college and obtain an education could lose the economic opportunities they need to stay relevant in the automation economy. Without policy adjustments to make college and post-graduate education more affordable, the result therefore could be rising inequality.

National Economic Scenarios Regarding AI Governments are not passive players at the mercy of a tidal wave of automation. Nations have a range of policy options available for responding to the economic pressure that AI will likely generate, from regulating industries to introducing a universal basic income. Countries will undoubtedly want to take advantage of AI as best they can while minimizing its harmful effects. What form that takes will depend on each country’s political economy and the national attitudes toward economic growth, unemployment, political unrest, and social welfare. The consequences of AI plus national policy responses could vary widely. Below are a few illustrative scenarios for how nations might end up after weathering and adapting to a wave of AI-driven creative disruption.

- **Bounty** – The advantages of AI in increasing productivity and prosperity could vastly outweigh the disadvantages to workers, and the outcome could be wealth and abundance for all, even those displaced by automation.
- **Rising inequality** – Even if workers displaced by AI find new jobs, the result could be rising inequality in a labor-light economy, as capital becomes more valuable and the wealthy get wealthier. As inequality widens, social and political instability could result.
- **Resource curse** – AI could lead to an economic paradox, much like the “resource curse” faced by countries abundant in natural resources. Even policy measures like universal basic income could fail to effectively translate to societal well-being and individual happiness.
- **Luddite’s revenge** – A dire scenario could be massive unemployment, as the fears of the 19th century Luddites finally come true and machinery eliminates jobs that are not replaced by new ones. One effect of narrow AI could be that humans simply are not as economically valuable as they once were, much like the decline in the role of horses in the global economy following the first and second industrial revolutions.⁷³
- **Generational dislocation** – Like the move from the field to the factory, AI could cause a transformation in the labor market that takes a generation to resolve. With a fundamental

skills mismatch between the people who have lost jobs and the skills needed for new jobs created by AI, the result could be social and political disruption lasting a generation. This disruption resolves itself over time as a new generation, educated and trained in the AI economy, dominates the labor market.

- Fall behind – Nations that fail to take advantage of AI or even resist it, for fear of potential economic and political disruption, could fall behind other countries, maintaining stability but at the cost of growth and national competitiveness.

Universal Basic Income Fear of the large-scale dislocation potential of AI, and the enormous social and political consequences that result, is a large driver of recent discussions about the possibility of universal basic income. Universal basic income represents the idea that the government would provide income, sufficient to live on, for everyone. High-profile business leaders such as Richard Branson have argued that universal basic income might become a necessity due to AI.⁷⁴ Essentially, if the labor market implications of AI are such that new industries and possibilities for human work do not emerge, huge segments of the population could end up more or less out of work, with capital concentrated ever more in the hands of the ultra-wealthy. This would not necessarily be due to corruption or poor decision-making, just the logic of the marketplace taken to an extreme. Thus, one potential solution is to offer those who are displaced by automation the potential for a guaranteed income, given that they are unlikely to have future workplace options.⁷⁵ Universal basic income raises many questions, of course. Who is paying in for universal basic income, and on what basis? Moreover, what about the possibility for adverse incentives? Universal basic income would essentially lessen the cost of free-riding on the system. It is also possible that universal basic income could reduce the incentive for innovation among people who otherwise would work hard to find new, productive industries where humans would have a comparative advantage over machines in an era of artificial intelligence. These are hard questions, and ones that policymakers will have to consider over the next decades.

Nationalism and International Conflict As described elsewhere in this report, the clearest national security consequence related to the economics of AI will be the integral link between economic power and military power. It is simply not possible to maintain a leading military over time with a declining economy. The analysis above also suggests, however, that the economic, social, and political dislocation caused by AI could generate additional international security consequences. Today, there are already political pressures in Western countries such as the United States and Great Britain that are focused on the ways the countries have changed for the worse. Automation and artificial intelligence have not yet received the blame for this, interestingly, despite the evidence presented above about the impact that automation has already had on the labor market. Instead, political arguments in the West often focus on issues such as immigration, outsourcing, or trade deficits with countries such as China.⁷⁶ If job losses, or even just labor force instability, from artificial intelligence accelerate, it could unleash a larger wave of populism and nationalism, as wealth concentration in the hands of a smaller and smaller number of elites generates resentment and political instability. On the global stage, labor force instability at the level AI could generate has in the past led to mass turmoil, coups, and other tension, as well as the type of virulent nationalism that can generate conflict, particularly if populations blame other nations for their economic woes. The Information Environment Digital technologies have radically transformed the information environment in the span of only a few decades, democratizing the number of voices, expanding the volume, and accelerating the speed of societal discourse. AI will continue to change the information environment as computers become more capable of targeting information at specific users, amplifying messages, filtering information, and even generating fake audio, images, and videos. The rapid evolution of the internet, social media, and disinformation suggests it is impossible to

predict how the information environment will evolve. Below are some challenges, however, that one can anticipate based on existing technology. The End of Truth AI has already demonstrated the ability to create audio and visual forgeries. Dr. Hany Farid, a professor of computer science at Dartmouth University who consults for the Associated Press to detect forged images and other media, has described the competition between forgery technology and authentication technology as an “arms race” and an “information war.”⁷⁷ At the moment, recording and authentication technology has the upper hand, but the trends are not favorable. Society may be only a few years away from such forgeries being able to fool not just the untrained eye and ear, but sophisticated forgery detection experts and systems.⁷⁸ This shift will bring profound implications across domains as diverse as corporate communications, courtroom evidence, journalism, and international security. Take, for instance, the Watergate scandal. President Richard Nixon maintained sufficient support in the Senate to block his removal from office even after two years of aggressive investigative reporting. Only upon the release of the “smoking gun” Oval Office audiotapes – where Nixon can be heard explicitly condoning a criminal cover-up and obstruction of justice – did his support in Congress finally fail. In a world where realistic forgeries were essentially impossible, audiotapes served not just as evidence but as undeniable proof. AI technology could weaken, if not end, recorded evidence’s ability to serve as proof. Some technologies, such as blockchain, may make it possible to authenticate the provenance of video and audio files. These technologies may not mature quickly enough, though. They could also prove too unwieldy to be used in many settings, or simply may not be enough to counteract humans’ cognitive susceptibility toward “seeing is believing.” The result could be the “end of truth,” where people revert to ever more tribalistic and factionalized news sources, each presenting or perceiving their own version of reality. AI-enabled forgeries are becoming possible at the same time that the world is grappling with renewed challenges of fake news and strategic propaganda. During the 2016 U.S. presidential election, for example, hundreds of millions of Americans were exposed to fake news. The Computational Propaganda Project at Oxford University found that during the election, “professional news content and junk news were shared in a one-to-one ratio, meaning that the amount of junk news shared on Twitter was the same as that of professional news.”⁷⁹ A common set of facts and a shared understanding of reality are essential to productive democratic discourse. The simultaneous rise of AI forgery technologies, fake news, and resurgent strategic propaganda poses an immense challenge to democratic governance. Political Power, Democracy, and Authoritarianism Due to private and public actors’ ability to use AI techniques to shape information flows and perceptions, they could affect democratic processes and the strength of authoritarian regimes while also shaping global public discourse. Potential application areas include:

- Electoral process influence – Highly granular voter profiling, enabled by the application of AI technologies, can affect democratic norms through the electoral process. Certain advances are likely to see more narrowly targeted content creation, with bots used to amplify this messaging in targeted sub-groups. For instance, these technologies were used in targeted political ads based on the social media profiles of voters in the 2016 U.S. presidential election and the U.K. Brexit referendum.⁸⁰ Mitigation measures for this personalized propaganda – often in private messages so no public data can be gathered and scrutinized – include Facebook’s pledge to make all “dark ads” on its platform public.⁸¹
- Authoritarian regimes – Social media allows authorities to manipulate the news environment and control messaging. In China today, reports estimate that the government creates and posts about 448 million social media comments a year.⁸² In some cases, bots are utilized to run propaganda efforts both inside and outside a home country, with the aim of creating a strategic advantage in today’s crowded information ecosystem.⁸³
- Social media – The

nature of AI makes it liable to concentrate information influence in the hands of a limited number of media platforms. Private companies not only control the data they collect, but can actively promote and demote specific content. Google, for example, de-ranks specific news outlets in its search results and only includes “publishers that are algorithmically determined to be an authoritative source of information” in its fact-checking features.⁸⁴ 21 21 • Future targeting efforts – Uses of AI to target audiences and spread disinformation include the expansion of automated spear phishing and sophisticated targeting of public sector employees with intent to influence government operations (i.e., orders spoofing).⁸⁵ Actors could also use AI to create “automated, hyper-personalized disinformation campaigns,” in which certain key demographics or areas (i.e., swing districts) are targeted to affect voting behavior at crucial times, potentially resulting in election shaping through sophisticated AI systems.⁸⁶ Because AI tools can be deployed at scale without large numbers of people, these tools could enable small numbers of people to wield outsize political influence, whether through governments, corporations, or other groups. The effect could be to erode the power of the people and democratic institutions and enable new forms of authoritarianism. CONCLUSION What world do we end up in? Does AI usher in a new era of prosperity and international peace? Does it lead to shifts in the balance of power on the global stage, with attendant risks of conflict and miscalculation? Could AI lead to massive dislocation and a rise in political unrest, nationalism, and protectionism? Does AI concentrate power to control information in the hands of a few, or continue the democratization of information that computers, networks, and social media have unleashed? Does the cacophony of competing information lead to a turn away from truth to authoritarianism and tribalism, or does the wisdom of the crowds win out with a convergence on truth and centrist policies? The technological opportunities enabled by artificial intelligence shape the future, but do not determine it. Nations, groups, and individuals have choices about how they employ and respond to various uses of AI. Their policy responses can guide, restrict, or encourage certain uses of AI. In order to manage the challenges ahead, the United States will need to adopt a national strategy for how to take advantage of the benefits of AI while mitigating its disruptive effects.

60. [News24 to use AI in moderating comments](#)

News24 will reintroduce comments below articles when our digital subscription service launches in August.

Subscribers will be able to air their views and make informed contributions below articles for the first time since News24 cancelled its commenting platform in 2015.

READ | [Paying to read: News24 follows global trends in ensuring quality, independent reportage](#)

With the assistance of artificial intelligence (AI) to moderate comments, the new commenting platform will reward relevant and insightful contributions.

Hateful and discriminatory comments will automatically be filtered for human moderation, using sophisticated software that many global publishers, including The Washington Post and The Wall Street Journal, have implemented.

"This is one of the most exciting aspects of our paywall launch," said Adriaan Basson, editor-in-chief of News24. "Since we took down comments in 2015, our readers have been begging us to return the ability for you to make your voices heard. We have found the perfect solution."

Subscribers will be able to comment and read comments on News24 and all our sections, including Fin24, Sport24 and Channel24. Comments will be moderated in accordance with our community guidelines.

Engage

Subscribers are encouraged to air their opinions about our articles, share knowledge, information or new facts, or provide tip offs for stories News24 should investigate.

If you like a comment, you will be able to "respect" it.

News24's moderators will have the ability to feature top comments and commentators.

Subscribers will be able to interact directly with News24's editors and journalists on this new commenting platform.

Basson said it was the right time to bring back comments after switching off the platform in 2015.

READ | [Media24 announces possible closure of several print titles](#)

"The previous commenting platform did not have sophisticated AI that flagged unacceptable and hateful contributions. Humans had to delete every comment that did not comply with our commenting policy.

"But all of this changed in 2016 when top publishers in the US, like the New York Times and The Washington Post, collaborated with data scientists to develop The Coral Project (now Coral by Vox Media). The same software, that News24 will use, automatically flags banned and toxic comments and words. Our moderators will have the opportunity to publish or delete these comments," said Basson.

Coral gives publishers like News24 the ability to set the toxicity level for comments that should be automatically published and those that must go through human moderation.

READ | [Good news!': News24 readers respond to news of subscription service](#)

Our new commenting platform will not allow hate speech, personal attacks, vulgarity, profanity, commercial promotion, false personas, spam or incoherence to be published.

Commentators who transgress our commenting policy will be warned and/or banned.

Said Basson: "We don't want our readers to have to leave News24 to air their opinions or contributions on our articles and columns. The popular social media platforms are drowning in fake news, hatred and filth.

"From August, subscribers will be able to talk to each other and to us in a civil and informative way, right here on their news platform of choice."

61. [ChatGPT for Translators: How to Use the Tool to Work More Efficiently?](#)

Test it before you reject it.

That's my approach when it comes to new technology. And that's what I did when the ChatGPT frenzy began.

Two months ago I embarked on a new testing journey and, to my surprise, I quickly joined the ChatGPT's fan club. Now I use this tool regularly, for example when I write and translate content.

How can translators benefit from ChatGPT?

There are many ways in which you can use the tool to make your work more efficient. Below you can find six ways in which I use it for my localization and translation projects:

1. Fighting with character limits in localization projects

If you regularly localize websites, mobile apps, or games, you probably know the pain of following strict character restrictions. Fighting with character limits might be exhausting, especially if you have to constantly come up with synonyms, rephrase or shorten your translation to fit the text into a tiny button space or menu layout.

Here's where ChatGPT can come into play.

You can prompt the tool to make your phrase shorter or to rephrase it when you run out of ideas. You can use the tool suggestions in your translation or treat the chat replies as rough ideas that need some tweaking:

You can also prompt the tool to count the characters for you or ask it to come up with a phrase of a certain length:

2. Finding collocations

Sometimes when you write or translate you get stuck and there seems to be no way out. You have a perfect word to express your idea, but for some reason, your mind refuses to convert it into a catchy phrase. Of course, you could use a collocation dictionary to find the right match, but you could also ask AI for help:

3. Searching for synonyms

Online thesaurus is a great resource when you're looking for synonyms, but if for some reason you get tired of switching between several tools or your thesaurus fails to amaze you, you can always turn to ChatGPT:

4. Create more idiomatic content

Most freelance translators are also writers. And sometimes writing takes us to a new territory, for example, when you end up creating content in your non-native language. That's what I'm doing right now. My blogs, videos, social media posts, and other marketing content are in English, but there are days when words escape me and I'm unable to quickly come up with a snappy text. Of course, I can browse through online dictionaries in search of a perfect idiom or phrasal verb. But I can also save some time by asking ChatGPT to do the same for me:

5. Reformulating poorly written content

Not all source texts are created equal. Some are ambiguous, confusing, and full of mistakes. Before you translate poorly written content you need to read it several times, use common sense, do some

research or let your intuition guide you to be able to determine the most likely meaning. You can also ask ChatGPT to simplify the language for you:

6. Switching between formal and informal style

Each time you write or translate you need to adopt a different style. When you deal with formal content for quite a long time, your mind might go blank when it's time to switch to a colloquial tone. Again, that's where ChatGPT can help you out:

Of course, you can prompt the tool to express the same idea in a more formal tone: ChatGPT can become an efficient tool for translators to carry out quick research or generate new ideas. All you need to do is to give it a try. Plus, learn how to prompt it correctly.

62. [TransPerfect generative AI](#)

Generative AI won't kill you, but it could kill your business if you don't adapt to it. According to [Venture Beat](#), 59% of organizations lack the resources to address expectations around generative AI. As more and more people use applications such as ChatGPT, Bard, and Claude, companies are analyzing the implications AND potential impact on their teams in customer experience, accounting, marketing, digital, and more. Given the speed at which the technology is advancing, it can be difficult to distinguish what can actually be implemented and have value today.

So, how to do it?

We recommend a consultative approach with the right partner and with a core axis that adds business value, improves processes, and reduces costs.

Generative AI depends on the data you train with.

TransPerfect leverages technology and incorporates generative AI in a lens best understood through three main categories:

Technology

Services

Solutions

In technology, TransPerfect's AI.NOW division was launched in 2023 after years of research and development with a specific focus on commercializing a solution that helps businesses leverage translation technology while prioritizing data protection and confidentiality. Some key advantages include:

Data Security and Privacy

Compliance Assurance

Customization and Control

Integration Capabilities

Risk Mitigation

Over 50% savings on localization costs

For services, data engineering partners stand out to help enterprises improve the way they interact with generative AI applications. This includes, but is not limited to, prompt engineering, example-based learning, and fine-tuning models to solve specific cases.

In the rapidly evolving landscape of artificial intelligence, the pivotal role of data engineering partners becomes increasingly apparent, particularly in the realm of services. These strategic collaborators serve as indispensable allies for enterprises seeking to enhance their engagement with generative AI applications. With a focus on refining the intricacies of data handling, data engineering partners excel in prompt engineering, leveraging example-based learning methodologies, and meticulously fine-tuning models to address specific use cases.

This collaborative approach not only amplifies the effectiveness of generative AI applications but also empowers enterprises to navigate the complexities of an ever-evolving digital landscape with unparalleled agility and innovation. Finally, our solutions are focused on quickly creating content that is scalable, gaining knowledge in market research, or creating popular multilingual chatbots in any language, based off of knowledge bases, among others.

Some examples from above:

E-learning

Problem: Complexity in content creation

Solution: Leverage training material for automated course outline

Results: 25% lower costs and (turnaround time) TAT

Product Support

Problem: Complexity in question answering in the value chain

Solution: GenAI to answer complex questions based on product information

Results: Increased CSAT and reduced in 25% the teams' workload

Digital Content

Problem: Cost and TAT for SEO-optimized multilingual content creation

Solution: GenAI combined with SEO data points for optimized creation (with humans in the loop).

Results: Over 50% reduction in costs and TAT

Data Auto-Labeling

Problem: High cost in human labeling

Solution: AI for data labeling and classification

Results: 70% cost reduction

Custom AI Solutions

Problem: Low availability and high cost of internal resources

Solution: Dedicated AI teams

Results: Faster time-to-market

In any scenario, we recommend starting with a pilot to assess the pros and cons of generative AI. If it doesn't work, it's best to look for another use case. But if there is a clear return on investment (there usually is), we recommend iterating continuously and scaling. It is important to note that, in addition to technology, detecting where people can take AI to the desired human level is key.

Generative AI has the potential to be a powerful tool for innovation and creativity, improving our productivity in the most repetitive tasks and unlocking our initial blank sheet in creative processes. As collaboration gets closer, AI will evolve and be able to solve increasingly complex problems. At TransPerfect, we are committed to the principles of responsible AI. We are flexible on models and hence we can help diverse industries.

For more information, [give us a shout!](#)

63. [Using AI for interpretation](#)

As the size of the global localization industry is projected to reach \$30 billion in 2024, several trends are poised to shape the industry's trajectory. Let's explore five of these trends:

AI and Machine Learning Integration:

The integration of artificial intelligence (AI) and machine learning (ML) technologies into localization processes is expected to continue growing. These technologies enhance translation efficiency, improve language accuracy, and assist in managing large volumes of content.

AI-driven localization tools have shown a 20% increase in translation speed and a 15% improvement in accuracy based on industry case studies.

Hyper-Personalization for Global Audiences:

Companies are increasingly adopting hyper-personalization strategies to tailor content and user experiences for specific global audiences. Localization efforts extend beyond translation, considering cultural nuances and regional preferences to create a more personalized user experience.

For example, e-commerce platforms like Amazon and Alibaba dynamically adjust content based on user location, language, and browsing history. One international fashion retailer achieved a 30% increase in online sales by tailoring product descriptions and marketing content to regional preferences.

Overall, companies adopting hyper-personalization witness, on average, a 19% increase in customer satisfaction and a 15% growth in conversion rates.

Focus on Multilingual SEO:

Search engine optimization (SEO) is crucial for online visibility. As businesses expand globally, there's a growing emphasis on multilingual SEO. Localization strategies now include optimizing content for different languages and regions to improve search rankings and increase organic traffic.

Global companies like Nike have dedicated multilingual websites and employ region-specific SEO strategies to enhance online visibility. Websites optimized for multilingual SEO experience a 30% average increase in organic traffic from international markets.

Continuous Localization in Agile Development:

Agile development methodologies are becoming more prevalent in software and product development. Localization is no longer a post-development phase but is integrated into the agile development process. This approach ensures that products are localized continuously and released simultaneously in multiple languages.

Tech giants like Microsoft incorporate localization into every sprint, ensuring that new features are released simultaneously across diverse language versions. Most software companies can reduce time-to-market by up to 20% by integrating localization within their agile development cycle, as well as 25% reduction in localization-related bottlenecks in software development.

Audiovisual Localization for Streaming Platforms:

With the rise of streaming platforms and the global popularity of video content, there's a growing demand for audiovisual localization. This includes subtitling, dubbing, and voiceovers to make video content accessible and culturally relevant to diverse audiences around the world.

Streaming services have witnessed a 40% increase in viewer engagement by offering content in local languages through dubbing and subtitling. That's why the global audiovisual localization market is expected to reach \$10 billion by 2024, driven by the surge in demand for multilingual content on streaming platforms.

These trends showcase the evolving landscape of localization, where technological advancements and strategic approaches cater to the diverse needs of a globalized economy.

[Adapting Multimedia for Diverse Platforms](#)

1. Importance of Adapting Content for Diverse Platforms:

In today's rapidly evolving digital landscape, businesses need to rethink their content creation strategies. One-size-fits-all content is no longer effective in engaging audiences across various digital platforms. Instead, a tailored approach that takes into account the unique characteristics of each platform is essential for success. This involves understanding the audience and cultural context of each platform, whether it's social media channels, streaming services, or e-learning platforms. By customizing multimedia content, businesses can create a meaningful impact and connect with their intended audience.

A. Audience Engagement:

In the age of social media dominance and digital content consumption, understanding the unique preferences and behaviors of audiences on different platforms is critical.

Tailoring content to suit the interactive nature of platforms, from short-form videos on TikTok to long-form content on YouTube, fosters increased engagement and cultivates lasting brand connections

For example:

TikTok's Triumph with Short-Form Content:

Example: Ocean Spray and the Fleetwood Mac Challenge

TikTok became a cultural phenomenon when a user, Nathan Apodaca, filmed himself skateboarding to work while sipping Ocean Spray cranberry juice and lip-syncing to Fleetwood Mac's "Dreams."

The short and simple nature of the video resonated with TikTok's fast-paced environment, leading to a viral trend. Ocean Spray's brand engagement soared as users across demographics embraced the trend, showcasing the platform's unique ability to turn spontaneous moments into widespread cultural phenomena.

LinkedIn's Embrace of Long-Form Thought Leadership:

Example: Bill Gates' Thoughtful Posts

Bill Gates, co-founder of Microsoft, consistently utilizes LinkedIn to share detailed insights and engage in conversations on topics ranging from global health to climate change.

By leveraging the platform's professional context and preference for in-depth discussions, Gates fosters meaningful engagement. His thought-provoking posts generate extensive discussions, showcasing how LinkedIn's environment encourages longer, substantive content that aligns with the platform's professional networking and knowledge-sharing focus

Global Social Media Usage:

In 2021, there were approximately 4.2 billion active social media users worldwide.

Users spend an average of 2 hours and 31 minutes per day on social media platforms.

Multilingual Internet Users:

A significant portion of internet users, around 75%, do not speak English as their first language.

This highlights the importance of translating content into various languages to reach a more diverse global audience.

B. Cultural Relevance:

Beyond linguistic translation, the localization of multimedia content requires a deep understanding of cultural nuances.

Adapting visuals, language, and context to align with the cultural sensitivities of diverse audiences ensures that content resonates authentically, avoiding unintended misunderstandings.

Take Coca-Cola for example, a global brand known for its iconic red cans and timeless marketing, which has consistently demonstrated a profound understanding of cultural nuances in its multimedia content localization efforts.

Visual Adaptation:

In the Middle East during the month of Ramadan, Coca-Cola has, for years, altered the design of its cans to feature a crescent moon and Arabic calligraphy, acknowledging and respecting the significance of the holy month. This visual adaptation ensures that the brand aligns with the cultural and religious values of the local audience, fostering a connection that goes beyond linguistic translation.

Language Tailoring:

In its “Share a Coke” campaign, Coca-Cola took a personalized approach by printing popular names on its cans and bottles. When expanding this campaign to different countries, the company not only translated names but also culturally adapted them. For instance, in China, where phonetic pronunciation differs, Coca-Cola adjusted the names to ensure they sounded natural and resonated with the local audience.

Contextual Alignment:

The “Open Happiness” campaign, a global initiative by Coca-Cola, focused on the universal theme of joy. However, the way joy is expressed varies across cultures. In Japan, where the cultural emphasis is on subtlety and harmony, the campaign emphasized moments of quiet happiness, aligning with the cultural context. In contrast, in Latin American countries, where vibrant celebrations are prevalent, the campaign took on a more energetic and festive tone.

C. Optimizing User Experience:

User experience is a pivotal aspect of multimedia content consumption, and adapting content formats is essential for enhancing engagement.

By tailoring content to suit the unique features and functionalities of each platform, businesses can ensure a seamless and enjoyable user experience, contributing to higher retention rates.

Netflix, a global streaming giant, exemplifies the importance of tailoring content formats to enhance user experience across different platforms. The company’s commitment to providing a seamless and enjoyable experience has contributed significantly to its success.

Adapting Content Formats:

On its web platform and smart TV applications, Netflix optimizes content for larger screens, allowing users to fully immerse themselves in high-quality visuals. For instance, original series and films are produced with cinematic quality, enhancing the viewing experience on larger devices.

On the mobile app, however, where users often consume content on smaller screens, Netflix employs a vertical video format. This adaptation caters to the way users naturally hold and interact with their smartphones, making it more convenient for on-the-go viewing.

Personalization and Recommendations:

Netflix's recommendation algorithm is another example of tailoring content to suit individual preferences. By analyzing a user's viewing history, the platform suggests content that aligns with their interests, creating a personalized experience.

The "Skip Intro" feature on the platform recognizes that users often prefer to jump straight into the content without watching the opening credits. This small but impactful adaptation contributes to a more user-friendly and streamlined experience.

Multi-Platform Consistency:

Whether users are accessing Netflix on a smart TV, a computer, or a mobile device, the platform maintains a consistent user interface and navigation structure. This ensures that users can easily transition between devices without a learning curve, contributing to a seamless and enjoyable experience.

D. Platform-Specific Strategies:

Each platform has its ecosystem and user expectations. Crafting platform-specific strategies is essential.

For example, on Instagram, visually appealing and concise content may thrive, while on LinkedIn, longer, thought-provoking pieces may be more effective. Understanding these nuances is key to successful multimedia localization.

For example:

National Geographic, a renowned global brand in the field of exploration and storytelling, effectively employs platform-specific strategies to cater to the distinct expectations and user behaviors on Instagram and LinkedIn.

Instagram:

On Instagram, a visually-driven platform where users often scroll through content quickly, National Geographic focuses on visually stunning and concise content. The organization's Instagram feed features captivating images from around the world, accompanied by brief and engaging captions.

For example, a visually striking photograph of a rare wildlife moment with a concise caption creates an instant visual impact, aligning with Instagram's preference for eye-catching content that can be consumed in a matter of seconds.

LinkedIn:

On LinkedIn, a professional networking platform geared toward business and thought leadership, National Geographic adopts a different approach. Here, the organization shares longer, thought-provoking pieces that delve into the scientific, cultural, and environmental aspects of their explorations.

An article detailing the behind-the-scenes challenges faced by National Geographic photographers, for instance, provides in-depth insights and aligns with the professional and knowledge-sharing ethos of LinkedIn.

Understanding Nuances:

National Geographic's success on both platforms demonstrates an understanding of the nuanced expectations of their audience on each platform. By tailoring their content to suit the ecosystem and user behavior of Instagram and LinkedIn, they effectively engage with diverse audiences and maintain a consistent brand presence across platforms.

2. Challenges and Solutions in Multimedia Translation:

A. Complexity of Media Formats:

The diversity of multimedia formats, including video, audio, and interactive content, poses a challenge in translation and localization.

Leveraging advanced translation tools capable of handling various media formats is crucial for maintaining the integrity of the content across diverse platforms.

B. Maintaining Consistency Across Platforms:

Achieving consistency in messaging and branding is challenging when dealing with multiple platforms.

Robust translation management systems play a pivotal role in maintaining coherence, ensuring that the essence of the brand is preserved across all localized content.

C. Cost and Time Constraints:

Timely localization within budget constraints is an ongoing challenge for businesses.

Automation and AI-driven solutions streamline workflows, reducing costs and accelerating the translation process without compromising the quality of the final product.

D. Quality Assurance in Multimedia Translation:

Ensuring high-quality translations in multimedia content demands rigorous quality assurance processes.

Incorporating comprehensive linguistic reviews, cultural sensitivity assessments, and user testing helps guarantee the accuracy and appropriateness of the localized content.

Let's take Video Streaming in perspective and see some statistics:

Video Streaming (SVoD) – Worldwide

The projected revenue in the Video Streaming (SVoD) market for Worldwide is expected to reach US\$95.88bn in 2023.

This indicates a promising growth potential for the market.

It is further projected that the revenue will experience a Compound Annual Growth Rate (CAGR) of 9.47% from 2023 to 2027, resulting in a market volume of US\$137.70bn by 2027.

This demonstrates the increasing popularity and demand for video streaming services globally.

When comparing the revenue generated in different countries, the United States stands out as the market leader.

In 2023, in the United States is projected to generate US\$39,250.00m in revenue.

This highlights the significant contribution of the United States to the global Video Streaming (SVoD) market market).

The average revenue per user (ARPU) in the Video Streaming (SVoD) market) market is expected to amount to US\$73.51 in 2023.

This metric provides insights into the financial performance of video streaming platforms per user.

It signifies the value generated from each user in terms of revenue.

In terms of the number of users, it is projected that the Video Streaming (SVoD) market) the market will have approximately 1.6bn users by 2027.

This indicates a substantial growth in user base, reflecting the increasing adoption of video streaming services worldwide.

The user penetration rate, which measures the proportion of the population using video streaming services, is expected to be 17.0% in 2023 and is projected to reach 20.7% by 2027.

This signifies the potential for further market expansion and penetration in the coming years.

In the United States, the video streaming market is dominated by Netflix, with a wide range of original content and a large subscriber base.

Conclusion:

In a world where multimedia localization is a driving force, businesses must strategically adapt content for diverse platforms to create a global impact. By understanding the unique dynamics of each platform, overcoming the challenges of multimedia translation, and incorporating innovative solutions, organizations can effectively engage with global audiences, contributing to a more interconnected and culturally resonant global community.

64. [Translation: Measures for the Management of Generative Artificial Intelligence Services \(Draft for Comment\) – April 2023](#)

Measures for the Management of Generative Artificial Intelligence Services (Draft for Comment)

Article 1: In order to stimulate the healthy development and standardized application of generative artificial intelligence (AI), on the basis of the [Cybersecurity Law of the People’s Republic of China](#), the [Data Security Law of the People’s Republic of China](#), the [Personal Information Protection Law of the People’s Republic of China](#), and other such laws and administrative regulations, these Measures are formulated.

Article 2: These Measures apply to the research, development, and use of products with generative AI functions, and to the provision of services to the public within the [mainland] territory of the People’s Republic of China.

Generative AI, as mentioned in these Measures, refers to technologies generating text, image, audio, video, code, or other such content based on algorithms, models, or rules.

Article 3: The State supports [indigenous innovation](#), broad application, and international cooperation in foundational technologies such as AI algorithms and frameworks, and encourages the prioritized use of secure and reliable software, tools, computing, and data resources.

Article 4: The provision of generative AI products or services shall abide by the requirements of laws and regulations, respect social virtue and good public customs, and conform to the following requirements:

Content generated through the use of generative AI shall reflect the Socialist Core Values, and may not contain: subversion of state power; overturning of the socialist system; incitement of separatism; harm to national unity; propagation of terrorism or extremism; propagation of ethnic hatred or ethnic discrimination; violent, obscene, or sexual information; false information; as well as content that may upset economic order or social order.

In processes such as algorithm design, selecting training data, model generation and model optimization, service provision, etc., adopt measures to prevent the emergence of discrimination on the basis of race, ethnicity, religious belief, nationality, region, sex, age, or profession.

Respect intellectual property rights and commercial ethics; advantages in algorithms, data, platforms, etc., may not be used to engage in unfair competition.

Content generated through the use of generative AI shall be true and accurate, and measures are to be adopted to prevent the generation of false information.

Respect the lawful rights and interests of others; prevent harm to the physical and mental health of others, infringement of their likeness rights, reputation rights and personal privacy, as well as infringement of intellectual property rights. It is prohibited to illegally obtain, divulge or use personal information and private [information], as well as commercial secrets.

Article 5: Organizations or individuals that use generative AI to provide services such as chat, text, image, or audio generation (hereinafter referred to as “providers”); including providing programmable interfaces [i.e., APIs] and other means which support others to themselves generate text, images, audio, etc.; bear responsibility as the producer of the content generated by the product. Where personal information is involved, they bear legal responsibility as personal information handlers and are to fulfill personal information protection obligations.

Article 6: Before using generative AI products to provide services to the public, a security assessment must be submitted to the state cyberspace and information department [i.e., the Cyberspace Administration of China] in accordance with the [Provisions on the Security Assessment of Internet Information Services With Public Opinion Properties or Social Mobilization Capacity](#), and the procedures of algorithm filing, modification, and cancellation of filing must be carried out in accordance with the [Internet Information Service Algorithmic Recommendation Management Provisions](#).

Article 7: Providers shall bear responsibility for the legality of the sources of generative AI product pre-training data and optimization training data.

Data used for generative AI product pre-training and optimization training shall satisfy the following requirements:

Conforming to the requirements of the Cybersecurity Law of the People's Republic of China and other such laws and regulations;

Not containing content infringing intellectual property rights;

Where data includes personal information, the consent of the personal information subject shall be obtained, or other procedures conforming with the provisions of laws and administrative regulations followed;

Be able to ensure the data's veracity, accuracy, objectivity, and diversity;

Other supervision requirements of the state cybersecurity and informatization department concerning generative AI functions and services.

Article 8: When human annotation is used in the development of generative AI products, providers shall formulate clear, specific, and practicable annotation rules conforming to the requirements of these Measures; necessary training of annotation personnel shall be conducted; and the validity of annotation content shall be spot checked.

Article 9: When providing generative AI services, users shall be required to provide real identity information in accordance with the provisions of the Cybersecurity Law of the People's Republic of China.

Article 10: Providers shall explicitly disclose the user groups, occasions, and uses for their services, and adopt appropriate measures to prevent users from excessive reliance on or addiction to generated content.

Article 11: In the process of providing services, providers have the duty to protect information input by users and usage records. They may not illegally preserve input information from which it is possible to deduce the identity of users, they may not conduct profiling on the basis of information input by users and their usage details, and they may not provide information input by users to others. Where laws or regulations provide otherwise, those provisions are to be followed.

Article 12: Providers may not engage in content generation that is discriminatory based on a user's race, nationality, sex, etc.

Article 13: Providers shall establish mechanisms for receiving and handling user complaints and promptly handle individual requests concerning revision, deletion, or masking of their personal information; and when they discover or learn that generated text, images, audio, video, etc., infringe other persons' likeness rights, reputation rights, personal privacy, or commercial secrets, or do not conform to the demands of these Measures, they shall adopt measures to cease generation and prevent the expansion of the harm.

Article 14: Providers shall, throughout the lifecycle, provide secure, stable and sustained services, and ensure users' normal usage.

Article 15: When generated content that does not conform to the requirements of these Measures is discovered during operations or reported by users, aside from adopting content filtering and

other such measures, repeat generation is to be prevented through such methods as optimization training within three months.

Article 16: Providers shall mark generated images, videos, and other content in accordance with the [Internet Information Service Deep Synthesis Management Provisions](#).

Article 17: Providers shall, in accordance with the requirements of the state cybersecurity and informatization department and relevant responsible departments, provide necessary information that could influence users trust or choices, including descriptions of the source, scale, type, quality, etc., of pre-training and optimization training data; rules for human annotation; the scale and type of human-annotated data; and foundational algorithms and technological systems.

Article 18: Providers shall guide users to scientifically understand and rationally use content generated by generative AI; not to use generated content to damage others' image, reputation, or other lawful rights and interests; and not to engage in commercial hype or improper marketing.

When users discover generated content that does not meet the requirements of these measures, they have the right to report this to cybersecurity and informatization departments or relevant responsible departments.

Article 19: If a provider finds that a user has used generative AI products to violate laws or regulations; violate business ethics or social virtue, including engaging in online hype, malicious posting and commenting, creating spam, or writing malicious software; or engage in improper business marketing; etc.; service shall be suspended or terminated.

Article 20: If a provider violates the provisions of the Measures, the cybersecurity and informatization department and relevant responsible departments are to impose penalties in accordance with the provisions of Cybersecurity Law of the People's Republic of China, the Data Security Law of the People's Republic of China, the Personal Information Protection Law of the People's Republic of China, and other such laws and administrative regulations.

Where there are no provisions of law or administrative regulation, the cybersecurity and informatization department and relevant responsible departments are to, in accordance with their duties, issue warnings, circulate criticisms, and order corrections within a set period of time. Where corrections are refused or circumstances are grave, they are to order suspension or termination of their use of generative AI provider services, and a penalty more than 10,000 yuan and less than 100,000 yuan is to be imposed. Where behavior constitutes a violation of public security management, public security management penalties are to be imposed in accordance with the law. Where a crime is constituted, criminal responsibility shall be pursued in accordance with the law.

[65. SDL to expand knowledge discovery and intelligent process automation to additional languages](#)

ROCKVILLE, Md., April 28, 2020 /PRNewswire/ -- [Expert System](#), a global leader in artificial intelligence applied to text, has partnered with [SDL plc](#), the intelligent language and content company, to enhance its AI-based Natural Language Understanding (NLU) platform with machine translation capabilities.

Expert System's AI-based Natural Language Understanding platform is used to automate knowledge-intensive processes, and is integrated into its search and discovery tool, which can be used to gain insight from documents, emails, reports and presentations. The integration with SDL Machine Translation will build on this to produce a powerful end-to-end multilingual content understanding platform with knowledge discovery features. SDL Machine Translation brings state-of-the-art neural machine translation capabilities to business functions through SDL Machine Translation Edge and SDL Machine Translation Cloud.

As a result, industry organizations including those in the life sciences, clinical research, insurance and government will be able to accurately translate their strategic information in up to 120 languages. Customers will also be able to adapt their language translation systems using their own data through SDL Machine Translation Edge, a secure and easy-to-use deep neural network machine learning software product.

"Multilingual AI is at the top of many organizations' agenda," said Maurizio Mencarini, VP Global Strategic Partnership at Expert System. "By joining forces with SDL, we extend our native multi-language capabilities to further break down language barriers. The integration of SDL software in our Medical Intelligence Platform, for example, further advances its Digital Disease Detection capabilities to proactively identify new outbreaks of biological threats such as COVID-19. In addition, its multilingual and multi-source (social media, web, medical reports, etc.) collection functionality generates a unique Horizon Scanning capability to enable monitoring and prevention of medical and social crises."

The integration of SDL Machine Translation into Expert System's AI platform covers both cloud and on-premise deployment. This provides customers with full control over their data management and security and allows for infrastructure flexibility.

Christophe Djaouani, SVP Regulated Industries at SDL, said: "We are excited to be partnering with Expert Systems to unlock new opportunities for multilingual content understanding. For example, by integrating our technologies, we can help health professionals to make sense of all the publicly available information regarding the COVID-19 crisis, along with clinical research data, and identify the best course of action in the shortest time frame. During this critical situation, our joint solution enables public authorities, finance, insurance and telecommunications service providers to leverage any source of information for decision making, while communicating with citizens and customers beyond any language restriction."

Expert System and SDL will be hosting the webinar Mitigate the Impact of Future Crises with Practical, Multilanguage Artificial Intelligence to demonstrate the integration between SDL neural machine translation capabilities and the Expert System Medical Intelligence Platform.

Join [George Bara, VP Strategic Partnerships & Alliances at SDL, and Andrea Melegari, SEVP Defence, Intelligence and Security at Expert System, on May 6, 2020 at 10:00 am ET to:](#)

Learn more about multilingual Artificial Intelligence applied to COVID-19 Digital Disease Detection;

Hear how multilingual content detection empowers NLU-based horizon scanning;

Understand why you should act today to control unexpected risk scenarios related to biological threats such as COVID-19.

[REGISTER HERE](#)

About SDL

SDL (LSE: SDL) is the intelligent language and content company. Our purpose is to enable global understanding, allowing organizations to communicate with their audiences worldwide, whatever the language, channel or touchpoint. We work with over 4,500 enterprise customers including 90 of the world's top brands and the majority of the largest companies in our target sectors. We help our customers overcome their content challenges of volume, velocity, quality, fragmentation, compliance and understanding through our unique combination of language services, language technologies and content technologies.

Learn more about SDL Machine Translation at www.sdl.com/MT

About Expert System

Expert System is a global leader in artificial intelligence applied to text. Its flagship platform provides a unique mix of natural language understanding and machine learning algorithms to help organizations bring human-like comprehension of any kind of text to accelerate business processes, enhance knowledge discovery and improve decision making. Headquartered in Italy (EXSY:MIL), Expert System operates throughout Europe, the Americas, Canada and the Middle East across a vast range of sectors and use cases including content enrichment, customer care, compliance, third party risk mitigation and intelligence applications. It has cemented itself at the forefront of the artificial intelligence sector, working with global businesses such as AXA XL, Lloyd's of London, Zurich Insurance Group, Generali, Bayer, Bloomberg BNA, BNP Paribas, Rabobank, Dow Jones, Gannett, IMF and EBSCO.

66 [Lionbridge usage of AI](#)

Read our take on [ChatGPT and localization](#) and learn why our Head of Product Language Services anticipates the AI technology will be a game-changer for the industry.

Win-Win-Win Automation

Our machine learning-driven tools create a win-win-win situation: a win for translators, who are matched to projects that better align with their interests and skills; a win for customers, who benefit from the consistency and expertise of the most relevant translators and resources assigned to their given project; and a win for us, because we're able to reduce inefficiency and augment customer satisfaction. Huge win.

How do we do it?

Tool 1: Domain Detector

The Lionbridge Domain Detector is a machine learning-driven component that automatically identifies the domain or industry to which a new translation project belongs. By detecting the appropriate domain, we can assign the most relevant and specialized translators and linguistic resources to the project.

We built the Domain Detector based on a taxonomy generated over 20+ years in the industry, with 30 first-level domains and 400 million human-tagged words. And that's just phase one.

The Domain Detector analyzes the content of a new project and first identifies an overarching primary domain to which it belongs; for example, "Automotive and Machinery." It will identify secondary and tertiary domains as well; for example, "Business and Commerce" and "Electronics," respectively.

Once we've appropriately identified these layers of specificity, we can get hyper-targeted when gathering the necessary resources to complete the project—from translation memories and glossaries to translators and subject matter experts. Our machine learning-based tool allows us to do this more quickly, easily, and accurately than a human alone could.

And that means that we match our translators more readily with projects that excite them. It means we can quickly and easily find the rare translator who is an automotive business expert also fluent in both Hindi and French. Those people exist in our pride—and our tools help us find them and activate them faster and with a higher likelihood of a successful outcome.

Tool 2: Customer Affinity

Similarly, our machine learning-based Customer Affinity tool helps us make data-driven decisions to minimize risk, increase quality, and reduce wasted time and duplicated effort on the part of our translator team.

The Customer Affinity component identifies content from existing customers that is most similar to the content of a new customer, utilizing translators who already have experience with similar content. The tool is fueled by machine learning that leverages content from 400 customers and 400 million words.

This means our team can select translators who are already familiar with a given subject or topic, and who have a proven ability working with that type of content. That allows translators to specialize and hone their skills with content that's relevant and interesting to them—and it adds confidence for new customers who can rest assured that we're not reinventing the wheel with each new project.

Tool 3: Automatic Translator Identifier

As mentioned above, the tools we've created work to identify the most appropriate linguistic resources and translators for a given job. Our new Automatic Translator Identifier uses large amounts of tagged linguistic data to compare project content with content from each translator that we have stored in our linguistic repository. The tool performs a comparative analysis and generates a list of best-fit translators for a given job.

This allows us to set up our translators for success by connecting them to work that already meets their skills. It means that translators can move faster and take on more work. It means our customers have a faster path to success. And it means each new project undertaken and each new word translated helps our system become even smarter, so we can continue making things easier, more relevant, and more engaging for our community of translators as well as for our customers.

Win. Win. Win.

Are the robots coming? Yes—but that doesn't have to strike fear in the hearts of translators. At Lionbridge, we plan to keep harnessing the power of AI to make our translators—and our customers—effective, efficient, and happy.

67. [ChatGPT translation](#)

Nowadays, artificial intelligence is playing a significant role in almost all markets. In recent days, there has been talking about creating content, translating, learning languages, and much more with the help of artificial intelligence; and one of the most popular AI at the moment is ChatGPT.

ChatGPT is a language model developed by OpenAI that can create text automatically, as well as translate text from different topics in many languages. This means that it can be used to create content and translate quickly and efficiently, articles, stories, product descriptions, copy, and more.

However, because it is an artificial intelligence, and it is still learning, so much of the final product will have to be checked and edited to improve it. And despite the fact that it is a very good tool for different activities, it is important to keep in mind that, at this moment, its capabilities do not compare to that of a human mind.

How Can ChatGPT Help You?

Literal translations: If we need the translation of a phrase, we can quickly resort to ChatGPT. But remember, these are AI translations that most likely contain syntax, grammar, and contextualization errors.

Text generation: ChatGPT can generate text autonomously, which makes it useful for tasks like writing articles, emails, text messages, and so on.

Automated responses: ChatGPT can be used to generate automated responses to frequently asked questions, which can help reduce the workload of customer support agents.

Keyword research: Just by typing the main or target keyword and asking the artificial intelligence for related keywords, you can get many suggestions for your articles.

Language comprehension: ChatGPT can be used as a language comprehension tool. If we don't understand an email, we can copy it and ask the AI to translate it into our language.

Text summarization: ChatGPT can summarize large amounts of text, which can be useful for data analysis tasks.

Writing assistant: ChatGPT can act as a writing assistant, suggesting words or phrases to complete or improve a text.

Will ChatGPT Replace Humans in Certain Jobs?

Although ChatGPT is a very useful tool for AI content creation, AI translation, and many other activities, it is not likely to replace humans in certain jobs, at least not in the near future. This artificial intelligence still needs to be polished and has to learn a lot to carry out work autonomously.

Regarding AI content creation, ChatGPT does not cite reliable sources, it simply takes information from the web, which could not be reliable. On the other hand, it also tends to make grammar mistakes, making sentences sound “robotized” and lacking in charisma. This also happens with translations; using the AI translations with this software generates lack concordance, have cultural and grammatical errors and are very literal.

The creators of this fantastic software may implement many updates to improve the performance of their tool. However, for the moment, the human mind is necessary to ensure that the final product has what it takes to hit the market. So you can rest a little easier, since experts are needed to review the content and translations that ChatGPT does.

Advantages of using ChatGPT:

Speed: You can create content automatically, which means it can be much faster than typing manually.

Efficiency: It has a wide variety of themes and formats, which means it can be used for a variety of tasks.

Personalization: It can be trained with specific content, allowing you to generate personalized articles for a company or industry.

Accessibility: It is available through an API, which means that it is easy to access and use.

Cost: Automatic translations through ChatGPT, just like with Google Translate or DeepL, and AI content creation are free.

Disadvantages of using ChatGPT:

Quality: As ChatGPT is a model based on machine learning, its quality will depend on the content with which it has been trained. This means that the generated content may contain errors or inaccuracies.

Requires review and editing: Although ChatGPT can create content automatically, it is recommended that you review and edit the content before using it. AI translations and content articles may have grammar and syntax issues, which can result in confusing or difficult-to-understand products.

Limitations on creativity and originality: Although ChatGPT is capable of auto-generating content, it still has limitations on creativity and originality compared to a human.

Dependency on data quality: ChatGPT is a data-driven model, so if the data you use has not good quality or is not up-to-date, the generated model may not be accurate or relevant.

Decontextualization: AI translations are word-for-word, therefore they do not take into account the context in which the text is used, which in many cases will lead to inaccurate or misleading translations.

Not enough languages: ChatGPT AI translations may have difficulties with rare languages or regional dialects.

In summary, although it is true that many of the comments on the Internet about ChatGPT are written to create fear for the many jobs people could lose, at the moment, that is not the case.

ChatGPT is still in the experimental phase and most importantly, it lacks the abilities of human beings, which means it makes a lot of mistakes.

On the other hand, it is important to emphasize the fact that all the content, as well as the translations, this tool makes needs to be reviewed. So, use ChatGPT with caution, have a professional improve what it creates, and make sure you have a good final product for your clients or audience.

68. [Globo Pacts with Google Cloud in Bid to Become a Mediatech Company](#)

Brazilian media giant [Globo](#) has forged a long-term strategic partnership with [Google Cloud](#) in its bid to become a full-fledged mediatech company. The new deal aims to bring more scale, efficiency and innovation to Globo's operations and distribution.

The brand new alliance dovetails with Globo's recent digital transformation, with a restructuring focused on direct-to-consumer deliveries.

Starting April 2021, over the next seven years, Globo will use Google's experience in data management, artificial intelligence (AI) and machine learning (ML), as well as its global, scalable and secure infrastructure, to bolster the company's digital evolution.

"In recent years, we dove deeply into our processes, so that the company was in fact prepared for the many challenges of the future," said Globo CEO Jorge Nóbrega, adding: "This strategic partnership will help us accelerate the main pillars of our transformation, such as focus on the public, data management, partnership for innovation and new business models."

"We've been facing the challenge of managing a high content consumption of programs like 'Big Brother Brazil,' which has been leading Globo's platforms to one of its best audience ratings in decades and hitting historic milestones on [streaming service] Globoplay, such as the record of three million votes per minute in this 21st season," Nobrega explained. "Therefore, having surpassed the 100 million monthly active users (MAU) mark and 100 million Globo IDs on our identity management system, Globo will benefit from the scale and AI/ML (artificial intelligence / machine learning) capabilities of Google Cloud to deliver a unique and personalized experience to our users," he continued.

Nobrega added: "By advancing our data-based strategy, and strengthening partnerships that allows us to integrate broadband and broadcast, we will be able to offer a more fluid and complementary navigation between digital and linear, but also new possibilities of hyper-segmentation of the content offer, personalizing recommendations in real time to our audience."

The deal is one of Google Cloud's biggest customer win in Latin America to date after in June 2019 Latin America became a dedicated Google Cloud region under new leadership, said Google Cloud President Robert Enslin,

"Businesses across industries are turning to Google Cloud to help them transform and modernize," he added, citing Mercado Libre, a regional online retailer, Grupo Herdez, a leading consumer goods company in Mexico, Brazilian bank BV, Alpargatas, a manufacturing company using Workspace, and Rubin Observatory, an astronomic research in Chile.

“Over the past year, media and entertainment companies have gone through immense changes, and a lot of companies are looking to build new services — streaming and otherwise — using technology,” Enslin added. “We’re here to help them do that, and our partnership with Grupo Globo exemplifies this.”

Nobrega pointed out that over 50% of the Brazilian households might have access to a connected TV ecosystem – which represents a strong opportunity to (re)start thinking TV as a mainstream media for communication, bringing all the metrics and business models typical of digital advertising to open TV.

Within the scope of the partnership, Globo said it aims to:

- *Migrate 100% of its data centers to Google Cloud, enabling scale in the production and distribution of media, launching new channels, among other initiatives;
- * Transfer its content to Google Cloud, as well as digital products and services, such as Globoplay and the “G family” — G1, [GE.com](#) and Gshow;
- * Optimize, modernize, and unify platforms through a scalable and flexible cloud-based technological architecture that will serve as a backbone for all the services and products of the media conglomerate;
- * Optimize personalized recommendations in real time to its audience. Google Cloud will also accelerate the training of Globo employees with advanced machine learning knowledge.

The first project will be the customized integration of Globoplay with Android TV OS, with the purpose of combining the programming of open TV (digital signal, broadcast) and TV via internet (broadband), resulting in new ways for audiences to watch Globo TV through a standard digital signal.

“Having Globoplay natively embedded into the Android TV OS opens up new opportunities to provide to our consumers a seamless and unique experience of watching free-to-air digital TV and enjoying their preferred shows on demand over Globoplay,” said Nobrega. “This is the concept of hybrid TV, combining in a single experience the big reach of the Globo broadcast TV in Brazil that reaches 100 million every day on its linear channel with the highly personalized experience of the Globoplay streaming service,” he noted.

69. [Traker translations security](#)

Security

Maintain peace of mind with the knowledge that our secure translation management platforms are operated within our ISO27001 certified information management system, demonstrating our commitment to protecting your information.

Features

Comprehensive Oversight

By uploading your compliance standard and documents into Straker.AI's Compliance Solution, you can rest easy knowing that our advanced AI is performing a rigorous analysis of the two. Once quickly completed, you'll rapidly receive a comprehensive scoring of how your compliance documents measured up to the desired standard.

Seamless Reporting

Save time and money. Simply upload the required compliance documents, the compliance standard you're using, and step away while waiting for your report to be emailed to you.

Make compliance Tracking Easy

By running your compliance checks through Straker's AI-assisted Compliance Solution, you don't just assure yourself of accurate and timely reviews. You also make the most of automated version control to enable greater tracking, helping you keep up with, and manage the pace of change.

Data privacy

We take pride in our reputation, and our global translation services have received many reviews commending our respect for company privacy. Our sophisticated privacy policies ensure complete translation security, allowing us to work confidently with several of the world's largest brands.

ISO 27001

Protecting your information is a responsibility we take seriously, which is why our information management system is ISO 27001 certified. This certification ensures we continually improve our translation information security systems, train our employees on the importance of security, and safeguard sensitive information in every document we translate.

GDPR

Our strict privacy policies adhere to all international regulations and privacy laws to ensure global translation data compliance. We're transparent about the data we collect, how we collect it with consent and how long we store this data. For more information, please go to our Privacy, GDPR and Cookies pages to download our policy information.

70. [Harness the power to AI for preservation of African languages](#)

The desire for technological advancements have been with us since before the Agrarian revolution and cuneiform writing in Mesopotamia about 12,000 years ago. Human civilization demanded assistance, through technology, to enable them to work faster and more efficiently as they could not entirely depend on human labour. These innovations have continued over the years, transforming industries and creating better outcomes while supporting humanity to realize their desired goals in daily existence. From the clay tablets in Mesopotamia, the Egyptian papyrus reeds to the discovery of paper and eventually computers and computerized writing, language

preservation has undergone remarkable transformations. This transformation and continued globalization also birthed the Language Services Industries. The language services industry in Africa, providing services for African languages in translation, interpretation, localization, media localization and publishing with the intention of promoting and preserving the indigenous African languages and culture has also been caught up in this evolution, with a continued desire to provide services that are adequate, reliable and faster for clients. Thus, Artificial Intelligence (AI) is one of those technological advancements that are being adopted to encourage machine learning, automated content creation and moderation and speech-to-text programs. Alupo et al, in an article titled '[Realizing the potential of AI in Africa](#)' emphasizes that the Global South cannot distance itself from the disruptive influence of artificial intelligence in their economies, from manufacturing, to services, to governance and its potential benefits if they have to match up to the Global West. The challenge however is how the use of AI for the promotion and preservation of African languages and cultures will not alter meanings of words and distort cultural values. This article, therefore, looks into how language service providers, stakeholders and custodians included, can maximize the use of AI in the promotion and preservation of African languages in localization without interfering with the original meanings of words and phrases and also not undermining African cultures. Localization in simple terms is adapting services and products within the needs of a particular culture, language or defined populations.

Understanding AI: Computer-Assisted Translation Systems Versus Machine Translation

You might also like

[Role of Translation of Political Texts in Fostering Inclusive Governance in Ghana](#)

[Transformative Role of Language in Shaping Gender Identity](#)

[Visiting Rwanda: What do I learn first, Kinyarwanda or Rwandan culture?](#)

If you constantly access the internet for information, it is certain that you have found yourself on websites that are in a language you do not understand and thus used Google Translate. This is one of the most used language translators. Or you are watching a film whose language you don't comprehend on YouTube and your movie is accompanied with words appearing magically below the screen, known as subtitles, to help you understand what the film is about. Sometimes the words are incomprehensible but somehow you manage to grasp a thing or two. This is possible because of computer aided translations systems and machine translation that is a product of artificial intelligence. In a recent conversation with [Nat King Taylor](#) on [Africa's LSP Podcast](#) by [Bolingito Consult](#) which you can listen to [here](#), [Sylvain Agbolo](#), an African language activist, linguist founder of [Multilingualism Week Conference](#) and translator in Accra, Ghana, emphasizes the need for language service providers and translators of African languages to acquire skills on AI to aid them in their work and enable them compete favorably with their competitors. First, we have to understand how this intelligence works and the kinds available and then look at their pros and cons in promoting and preserving African languages and cultures.

A computer-aided translation, also called computer-assisted translation (CAT) tool, is a software with a Translation Memory (TM) at its core to assist in collection of individual translation units in a database. The CAT [supports translators in preparing translations](#) by converting texts, segmenting and then availing these segments for translation. You can read a detailed explanation of CAT and how it works [here](#). Just as the name suggests, the CAT tool's work is to support a human translator

and cannot do translations independently. Studies show that [translators work 28% faster](#) when engaging CAT tools in their translation works. They also offer translations that are fast, of high quality and ensure consistency of the translations. Moreover, it enables the preparation and segmentation of translations in a variety of formats like Microsoft Word, XML files, Excel and PowerPoint files as well as Open Office files. Some of the popular CAT tools available in the market include: memoQ, Smartcat, SDL Trados Studio, Wordfast, Across and OmegaT.

Machine translation application (Machine translation) is the opposite of CAT as it works independent of human involvement. This means that in a Machine translation program, texts are fed to a computer algorithm that automatically translates it to another language. There are [three types of Machine translation methods](#): a) Rules-based: relies on grammar and language rules that have been developed by language experts, and also used on highly customisable dictionaries. b) Statistical machine: this method works by analyzing human translations that are already in existence in large volumes and c) Neural machine: This method works by teaching itself translation using a large neural network. It has gained popularity against rules-based and statistical machines because it provides better results than the two. Some of the popularly used machine translation application programs include: Systran, DeepL, Microsoft Translator, Amazon MT, Tilde MT, Google MT and Omniscien Technologies.

The pros and cons of translation of African languages through AI

As per the discussion on artificial intelligence programs on language translation, it is obvious that humans cannot distance themselves from this technology as the demand for its use keeps increasing. Globalization keeps demanding for localization, economically, socially and culturally, which means that there is a technological demand to service this desire for efficient and effective results. Africa can benefit greatly in the preservation and promotion of its indigenous languages through translations via artificial intelligence programs. These languages will not only be accessible to millions of people all over the world but also not be threatened to extinction. Alana Cullen, in the article '[How artificial intelligence “works” in literary translation](#)', cites that Google Translate, at the time of its launch in 2006 could translate only two languages. Ten years later, 2016, it was able to translate over 100 billion words per day while supporting over 103 languages. Currently, it has gone beyond translation and transcribes eight of the world's most spoken languages in real time.

Even though language service providers are embracing AI programs in carrying out translation, they still engage human editors and translators, known as 'post-editors', to cross check the results. While it is less costly to work entirely with the artificial intelligence programs, depending on them only could result in substandard work. The complexity and dynamism of language still requires human input as the machines do not have the capacity to accurately identify the nuances of language. Sylvain encourages African translators to constantly train and refresh their skills in AI as it does not mean that their services will be rendered useless if they engage in it. For it is only through the translators that the African languages will be input in the data system of the translation intelligence programs without distorting the meaning.

It is important to note that the CAT tools and the Machine Translation (MT) programs work differently and also serve different purposes. CAT tools lean towards professional use and are not suitable for non professional users and the engagement of human translation is not only limited but also costly. This therefore means that MT programs, while their cost is low and non professional users can work with it, they are not as reliable as the CAT tools. Their major

advantage is that they are accompanied by human reviewers or translators to ensure data output is adequate. This is probably what can work around the complexity of the African languages that are over 2000 with each having their own grammatical structures and pronunciation.

In a discussion with [Stephen Kiilu](#), an African Master's in Machine Intelligence student at AIMS Senegal, currently researching on how to preserve African languages through [NLP \(natural language processing\)](#), he shares that the greatest challenges involved in creating AI translation is getting adequate human translators that can help generate data for intelligence systems to use in translation. NLP is an emerging artificial intelligence field that trains computers to understand human languages. Stephen explains that intelligence systems need a large pool of data, which African languages do not possess, in creating translations that can be used in real time. Most of the data on African languages is largely on bible translations which is not adequate to create a translation system for African languages. Unlike Kiswahili, which has a large pool of data through research, documentations, dictionaries online amongst others, indigenous languages, even though spoken fluently by its speakers, do not have this advantage.

[Meta AI](#), from Meta technology company, emphasizes the concerns raised by Stephen Kiilu, noting that AI translation systems of today are not designed to serve the thousands of languages used around the world, or to provide real-time speech-to-speech translation. Meta technology is an American multinational technology conglomerate that owns Facebook, Instagram and WhatsApp, and other services and products, owned by Mark Zuckerberg. In 2022, Meta announced a new AI Model, [No Language Left Behind \(NLLB\)](#), that will translate 200 languages that will enable more people to have access to technology. Yet still on these social media platforms, the translation is not as adequate as desired. This means that artificial intelligence requires the input of human labor to realize its goals. It also means that Africa should invest more in technologically advancing its indigenous languages to avoid distortion of meanings and interference of culture, its norms, values and mores. And the only way for these indigenous languages to be preserved and promoted without meanings of words being distorted is to have proactive [stakeholders](#) and [custodians](#) in the language service industry working together to achieve this goal.

In Conclusion

Artificial intelligence will not take the place of humans. As discussed in this article, there is a lot of human labour that is needed to enable the success of AI in translation. If all the 2000 and more languages spoken in Africa have to be translated through AI, it means that the job market in the language services industry is bigger than can possibly be imagined. The preservation and promotion of African languages, and by extension African cultures should be treated with the urgency it deserves. Through the articles on the role of stakeholders and custodians of African languages and cultures, African languages are on the verge of extinction due to the competition with other internationally recognized languages. Yet, Africa still needs to have international recognition and relevance to compete favourably with other nations globally to achieve its economic, social, political and cultural goals. Artificial intelligence, if well explored, is the future for the preservation and promotion of African languages and cultures. There is already international backing on the importance of the promotion and preservation of African languages for sustainable development. It is therefore upon Africa to tap into its resources to harness and maximize the use of artificial intelligence for language translation to achieve its goals.

71. [Applications of Artificial Intelligence In EPC](#)

Applications of Artificial Intelligence, Deep Learning, Machine Learning, and the EPC Industry

Advances in big data collection and processing, distributed computing technologies, and statistical algorithms have mutually accelerated over the past few years. Companies of all sizes are taking advantage of their collective power to implement numerous forms of artificial intelligence, including machine learning and deep learning, to benefit their customers and business. More so than ever before, companies that are not traditional tech companies, like those in the EPC industry, are finding value in AI and data science. This added value is proving to be not just for Silicon Valley heavyweights. Bechtel is [leveraging applications of artificial intelligence](#) to evaluate project data to better understand schedule correlations, as well as improve its prediction capabilities.

As artificial intelligence (AI), data science, and big data become the buzzwords du jour, companies increasingly find themselves searching for data scientists, architects, and analysts without a plan. Understanding what AI is, what data science can do, and what it requires for success is a necessary first step.

AI refers to technologies with the ability to perceive their surroundings, formulate strategies, and make decisions in pursuit of a goal.

The precise threshold for what counts as AI is subject to interpretation. While people tend to use the term AI to describe machines completing tasks once performed primarily by humans, the reference point has shifted as the domains of machines and humans increasingly overlap. In what is known as the ‘AI effect,’ humans discount the ‘real intelligence’ associated with a task once a machine has successfully performed it.

With respect to determining ‘real intelligence’, AI can be theoretically divided: general or strong AI and specialized or weak AI.

General AI describes intelligence theoretically equivalent to the intelligence of human beings. Problems that require General AI are called AI-complete or AI-hard; the solver must learn, plan, make decisions in uncertainty, and even fundamentally re-program itself in order to arrive at a satisfactory result. Such problems cannot be solved with a specific algorithm or combination of specific algorithms. Presently, no AI-complete problems can be solved without a human in the loop and General AI does not yet exist.

All of our existing AI technologies constitute—at best—weak AI. That is, AI designed to focus on a specific problem. Weak AI is not self-aware and it does not have the ability to apply intelligence to any problem.

Siri and Alexa are examples of sophisticated-weak AI. What they do, they do well; but they operate within a defined range and struggle to deal with inputs outside of their limits. Despite not being generally intelligent, weak AI is still powerful; it can automatically regulate a city’s power and predict the stock market, as well as knock out an electric grid or spark an economic disaster (e.g., the May 2010 “flash crash” for which much of the blame fell on high-frequency trading algorithms).

Applications of Artificial Intelligence Augment Human Expertise

One may object that every project is unique and thus AI, which relies on the presence of patterns and relationships in data does not apply. Every project is unique, and we can leverage AI to improve project delivery. We do not propose to remove humans and their necessary expertise from the process—general AI, after all, doesn't exist. But AI-based solutions can range from automation to augmentation. It is with the latter, 'augmented intelligence', in which the most dramatic impacts can be seen. AI can process billions of data points and synthesize the most significant possibilities.

For example, AI-backed decision support of construction sequencing will aid in both long-term planning and immediate decision-making by helping make apparent the (potentially unintended) impacts of different scenarios. In each case, we want to leverage big data and artificial intelligence to support humans, so Bechtel's experts are focused on the highest value tasks.

The primary driver of AI is machine learning.

Machine learning enables technologies to learn on their own. More specifically, machine learning applications use algorithms to teach machines how to learn from data, as opposed to what to learn. These algorithms identify patterns in observed data, build models to capture those patterns, and use them to predict new outcomes.

Deep learning techniques, a part of the machine learning family, aims to learn meaningful representations of and relationships within the underlying data as opposed to simply accomplish a specific task. We may then ask questions of and make predictions from the deep learning representations. Roughly speaking, deep learning attempts to mirror the information processing and communication patterns of the human nervous system and brain. The results of deep learning moves us closer to general AI, but still have a ways to go to reach human intelligence, particularly with respect to uncertainty and previously unseen information.

In all, AI can be used to understand and predict risk, optimize planning, [detect anomalies](#), and respond to unexpected events—to name only a few.

AI for EPC

Success in this pursuit can disrupt our massive industry. [Construction-related spending](#) accounts for about 13 percent of the world's gross domestic product (GDP). In 2013, global investments in energy, infrastructure, mining, and real-estate-related projects was about \$6 trillion. By 2030, that could be almost \$13 trillion.

And the biggest problem facing the EPC industry? Productivity.

Where nearly every other industry is progressing, productivity in construction has advanced only one percent [over the past 20 years](#). To put that into perspective, productivity in manufacturing has nearly doubled in that time. In a market that contributes to so much of the world's GDP, even small improvements to labor productivity would have tremendous impact. With advancements in data, computing, and algorithmic learning, we have the opportunity for immense progress.

Bechtel is particularly well-positioned to lead the charge, and we're doing so through our Big Data and Analytics Center of Excellence. With 120 years of data increasingly at its fingertips through digitization efforts, we can ask where hidden inefficiencies might lie and what might drive them. Presently, for example, we are developing a machine-learning tool to identify the most efficient construction packaging sequences for our most complex projects. Through artificial intelligence we are able to find connections and learn new solutions we would not be able to find if every

possibility had to be tested in the wild. We can do so in the presence of dynamic factors and shifting constraints. Once faced with unexpected weather, material or labor shortages, our project teams will be able to ask: “What is the best approach from this point forward?” Machine learning will allow us to optimize in real time as events impact schedule and execution.

AI will continue to improve for the EPC industry as the technology advances and consistent baselining can be captured. In follow up pieces, we will dive into examples of how Bechtel is driving innovation by using AI and machine learning to tackle the industry’s most pressing challenges, and how our organization is transforming in response.

[72. AI at 2023 summit](#)

Turner Construction Company recently held its eighth Innovation Summit, gathering 250 professionals from Turner and affiliate companies HOCHTIEF, ACS, Dragados, Flatiron, Real PM, and Clark Builders. For three days, participants delved deep into the theme “From Artificial Intelligence (AI) to Intelligence Augmentation (IA).” Participants engaged in sessions and hands-on workshops which illuminated the state-of-the-art in AI, its role in enhancing human skills, and a humanistic path forward in AI applications at Turner and beyond.

AI thought leaders presented a range of great practices and novel AI solutions in place to help employees mine and analyze Turner’s vast data warehouse to enhance risk management and improve access to information. In addition, an AI tool that adds efficiency and automation to the drafting of the approximately 30,000 trade contracts the company issues each year was demonstrated, and the Turner Engineering Group shared how they are exploring the integration of generative design into their processes.

Attendees collaborated to synthesize insights and imagine AI’s applicability in their work areas. “It is clear that AI and other technologies discussed at the conference can refine operations, heighten sustainability, reduce risks, and foster positive transformation within the built environment,” said [Kris Wahl](#), Innovation Manager. Wahl continued, “The most promising concepts are undergoing evaluation for further development.”

Turner promotes the ethical application of AI in construction, ensuring benefits for its workforce and the broader communities they serve. “This summit highlighted our people-first approach to innovations, especially AI,” said [Jim Barrett](#), Vice President and Chief Innovation Officer. Barrett continued, “More than just showcasing our advancements in AI, the event reaffirmed our commitment to prioritizing people in innovation. With the limitless capabilities of AI, we aspire to go beyond mere automation and unlock our people’s unparalleled potential.”

[73. Hyundai E&C ensures Safety and Quality Management of construction sites using AI video analysis](#)

xHyundai E&C is accelerating smart construction management by developing AI (artificial intelligence)-based construction site video analysis technology and registering patents

In general, AI for video analysis applied to construction sites is developed by asking AI-specialized companies in the areas of video data collection, training and development of AI, and as for the latter, they have used public data to date, as they struggle to understand the specificity of construction sites and access the real on-site imaging data.

Due to this reason, application was easy for industrial sites with stable working environments, but more difficult for construction sites where the working environment varies depending on the progress of the construction, more particularly in the safety sector with few relevant cases.

In order to address these challenges, Hyundai E&C internally built an “On-site CCTV Video Analysis System” with AI-trained data specialized in the construction sector through various video images collected at Hyundai E&C sites.

[Hyundai E&C wins one of the world’s top three design awards for four consecutive years](#)

[2024.04.09 2min 20sec read 2709](#)

[Hyundai E&C Signs PPA for Solar Renewables with Glennmont D&D Solar Holdings](#)

[2024.03.12 3min 31sec read 3499](#)

[Hyundai E&C to Embark on UK SMR Project forging Korea-US-UK Technology Alliance](#)

[2024.03.06 4min 57sec read 3855](#)

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[On-site CCTV Video Analysis System - Safety Violation Detection and Alarm Alert]

[On-site CCTV Video Analysis System - Location of On-site Camera and AI Analysis Status]

Hyundai E&C collected video images to develop a "on-site CCTV video analysis system" and selected data and scenarios that can reflect the reality of safety management at construction sites.

Data and scenarios for on-site safety management were selected in line with the construction safety-related laws and standards, and virtual data including 3D graphics were used for videos of fires at construction sites, which are difficult to obtain.

Based on this, training data, including more than 2 million working objects such as construction equipment, workers, flames, and smoke were built, and a 'on-site CCTV video analysis system' was developed by integrating them with technologies of AI companies.

The Hyundai E&C-developed system is a technology that enables AI to detect the location of workers, construction equipment, and fire risk factors in real time and prevent risks in advance.

AI analyzes images transmitted through CCTV in real time, identify and prevent at-risk distance of stricture accident of equipment, by detecting construction equipment, signalman, and guidance staff.

In addition, based on the posture estimation algorithm, it is possible to thoroughly manage safety in the workplace by detecting major joints and actions of the head, hands, and neck of the worker and recognize dangerous movements.

Hyundai E&C has recently applied its latest AI model by remotely connecting CCTV images and completed performance verification. In the future, it plans to supplement the effectiveness of various site-specific scenarios and apply them to domestic sites.

In addition, Hyundai E&C has devised and registered a patent for the first time in Korea for securing the quality and safety of ready-mixed concrete using a smartphone and has lead quality management on sites using AI by developing a commercialization system in cooperation with IT companies.

The technology, developed by Hyundai E&C, is a system that can monitor concrete discharged from ready-mixed concrete vehicles in real time using a smartphone and check the defectiveness of the ready-mixed concrete.

First of all, ▲ a camera photographs the ready-mixed concrete discharged from the cement mixer truck, ▲ determines whether the ready-mixed concrete material can be separated by comparatively analyzing AI-shot images with pre-learned images, and ▲ automatically generates an alarm through the system in case of defect to stop concrete placement.

Hyundai E&C plans to upgrade this technology to an integrated solution that can easily manage quality of structures at construction sites, by integrating it with various technologies such as existing concrete crack diagnosis algorithm*.

* Concrete crack diagnosis algorithm: Hyundai E&C's existing technology, whose algorithm inquires the area and location of the crack, the time of crack, and concrete placement information when a concrete crack occurs. When the inquiry is processed, the program will also provide a report including countermeasures based on the root cause analysis.

Meanwhile, Hyundai E&C has been accelerating efforts to conduct various researches and developments to lead AI technologies in the construction sector, ever since it established an organization dedicated to big data/AI within Hyundai Institute of Construction Technology in 2018.

In the future, it plans to develop core AI technologies that can be applied to construction sites through various research and development, expand their applications, and gain an upper hand in the AI-based construction sector.

A Hyundai E&C official said, "As smart construction applying advanced technologies develops day by day, its importance and utilization at construction sites will grow further," adding that, "We will continue to secure and utilize quality data suitable for construction sites and lead AI technologies in the construction sector."

74. [Shimizu develops AI systems for initial structural designs](#)

Shimizu Corp. has developed a system powered by artificial intelligence to assist in structural designs, including determining the framework of a building.

The company hopes this can possibly shorten the time required to create an initial design plan from about a week to a few hours.

The Tokyo-based firm expects the system to reduce the impact of the so-called 2024 problem that might arise when overtime regulations in the construction industry will be tightened.

Structural designs are the initial stage of work to construct a building. Information such as the height and area of an envisaged building is entered into the new system, and the AI software creates a 3D model by extracting similar structural specifications based on past designs.

The system can automatically show the size and quantity of columns and beams, so designers only need to select the data suited to clients' design wishes and make minor adjustments to create plans.

Many complicated calculations have been burdensome for young and inexperienced designers. The AI tool will not only streamline the process, but also enable multiple proposals to be presented to clients without spending considerable amounts of time, while also making it easier to respond to changes in the plans.

Currently, the system can be used for office buildings that are up to 60 meters high. The company intends to expand the capability of the AI system in the future to handle designs for structures that require complex calculations, such as condominiums, hospitals and skyscrapers.

75. [Innovation and prospective](#)

Creating new opportunities for Group companies

Stimulating innovation is an integral part of VINCI's strategy and accelerates the transformation of its business activities, products and services. In addition to the multi-business initiatives driving innovation at Group level, which include Leonard, lab recherche environnement and La Fabrique de la Cité, each business line houses a platform to infuse innovation in its sphere of activity, such as La Factory (Paris) at VINCI Energies, the tech startup Cyclope.ai at VINCI Autoroutes, the network of innovation centres of excellence at VINCI Concessions, and Eurovia's international research centre in Bordeaux.

To imagine VINCI tomorrow

To adapt to today's many challenges—energy transition, digital revolution, much shorter innovation cycles – VINCI has set up [Leonard](#), a Group-wide market intelligence and foresight structure.

Market

intelligence

Leonard, the Group's innovation and foresight platform, has continued to support entrepreneurial innovation. The Intrapreneurs track welcomed nine new projects imagined by VINCI employees, while incubated projects from previous cohorts continued their development in the Group. Twelve of these have already evolved into new business activities or operating entities, such as Waste Marketplace, a digital solution for worksite waste management, and e>béton, a platform for the distribution of low-carbon concrete in the Exegy® range. An artificial intelligence track was inaugurated in 2020, generating six AI applications for the Group's businesses, in addition to AI training courses for employees.

Events

Leonard's teams organised a number of events during France's first lockdown due to the health crisis, including a series of daily virtual conferences. In September, the Building Beyond festival assembled some 100 speakers and more than 2,500 participants online and at Leonard:Paris. Internationally, Leonard expanded its activities in the DACH region (Germany, Austria and Switzerland), assisted by the German subsidiaries of Eurovia and VINCI Energies.

Prospective

Leonard regularly brings together prospective groups whose task is to identify long-term challenges for VINCI, opportunities for change in the Group's business activities and organisation, and new sources of growth.

Incubator

Leonard also supported five early stage startups in the Seed track, helping them to adjust their business plans to market realities. The 11 growth-stage ventures in the Catalyst track partnered with Group companies to expand their products and services. These programmes are turning Leonard into the foremost incubator, for both startups and investors, in VINCI's sphere of businesses. Leonard also produces foresight studies, integrating the input of Group companies to help build projects with real-world applications. For example, Leonard's work on autonomous, connected electric vehicles led to Eurovia's participation in the testing of a selfdriving shuttle in rural areas. This coordinated approach has been validated by France's national strategy for autonomous mobility, which recognises the need for cooperation between autonomous vehicles and road infrastructure. Leonard also joined forces with Shell and the OECD to develop three scenarios, to which about 30 experts have contributed, for achieving carbon neutrality for the city of Paris by 2050.

[76. Innovation strategy](#)

MISSIONS

Through its innovation strategy, the Bouygues group is preparing itself for changes in user behaviour, technological developments and the emergence of new, sustainable business models. Bouygues puts innovation to work for the benefit of its customers and its Climate strategy, while its intrapreneurship programme fosters a culture of innovation across its business segments.

Innovation and Elab, the Group's innovation unit

Bouygues' strategy in the field of innovation is focused on delivering services that provide real benefits to users. The aim is to make the daily lives of the Group's customers, partners and employees simpler. It is also to improve its productivity and boost stakeholder satisfaction by creating sustainable solutions. Harnessing the potential of technology

The Bouygues group has pinpointed four technologies that it believes will shape its businesses:

Artificial intelligence (AI) can provide effective decision-support to many of the Group's business segments. For instance, by analysing physical data from a site, as well as regulations and environmental factors, AI can optimise the building potential of land and facilitate interaction between the stakeholders in a property development project (developers, architects, consultancy firms and local authorities).

of high-risk areas on road networks through the analysis of vehicle behaviour.

The Internet of Things, combined with Big Data, can harvest and analyse data on an enormous scale for the predictive identification of high-risk areas on road networks through the analysis of vehicle behaviour.

With virtual and augmented reality, it is possible to interact in real time with digital elements that have been added to a live view. For example, brands can insert advertising into a television show without interrupting it. With BIM (Building Information Modelling), 3D can be used to represent a whole range of data used in the design and construction of a structure and simulate its behaviour.

Finally, blockchain, by making flows more secure, will facilitate the creation of new services by simplifying transaction processes. For instance, it is currently being used to ensure more secure, transparent and faster signing of complex contracts.

Supporting the transformation

Creating ground-breaking products and services for customers based on new sustainable business models. Since 2021 Bouygues Construction has been developing 20 "Build-to-Rent" programmes. These are fully-serviced, ready-to-rent homes built with urban families and households in mind, providing occupants with a better quality of life at a competitive cost. Also in 2021, Bouygues Immobilier launched the "Majorelle" project, a new range of affordable, modular housing units that can be adapted as families grow.

Testing and providing solutions to facilitate the ecological transition. Bouygues Energies & Services and PowiDian are collaborating to explore growth opportunities and identify use cases in the emerging green hydrogen market.

Digitising processes and optimising materials for the Construction businesses. Colas' Grid2BIM project is on-line software that uses deep learning algorithms to convert underground network plans into very precise 3D-compatible models, thus reducing lead times and costs.

Supporting the transformation In a context where small agile companies can disrupt entire ecosystems, Elab supports the Group's subsidiaries with their transformation.

By applying nimble methods focused on uses, such as design thinking, business model canvas, C/K method and value quadrant, we help our customers carry out their business transformation:

Creation and launch of new products and services or innovative business activities.

Business transformation, by helping to adapt the core business to new market opportunities (new technologies, new customer demands, new competitors).

[ByTech](#) is an in-house community of IT, digital and innovation employees.

Monitoring of technological advances worldwide

BOUYGUES ASIA

Bouygues Asia was originally set up in Tokyo in 2002 as a subsidiary of Bouygues Telecom within the framework of the partnership with leading Japanese telecoms operator NTT Docomo. Today, Bouygues Asia represents the interests of the entire Group. This multicultural entity monitors the key players in Asia's innovation ecosystem and offers assistance to the Group's business segments and to customers outside the Group wishing to look for partnerships.

WINNOVATION

Winnovation is a Group subsidiary based in the US responsible for meeting companies or start-ups with which strategic partnerships can be formed. Winnovation also helps its customers with partnership negotiations. This unit also actively monitors US markets for developments in the domains of technology, marketing and strategy.

77. [Shareholder's meeting & future prospects](#)

Hello, nice to meet you, my name is Chris and I work at Hochtief, a company of the ACS Group, world leader in infrastructure and services.

Would you like to take a look at what we do around the world? Come with me and I'll show you.

Here in Los Angeles, Turner, an ACS Group company, is building one of the largest stadiums in the world, a large construction with around 2,500 workers. It will be the Los Angeles Rams and Los Angeles Chargers stadium and the venue for the opening ceremony of the 2028 Olympics.

Construction works are being digitized more and more and the ACS Group is also at the forefront of technology.

Here you can see our professionals in ESSEN discussing an information model for the construction of the new Northwest Metro in Sydney with our Australian colleagues from Fimik in Sydney. Digital models based on 3D and logistic data are improving the efficiency of construction processes making them safer and more effective.

The ACS Group is working on Phase 2 of the Sydney Metro, where sustainable construction plays a leading role. And working physically in the construction zone is still very real, this implies huge construction machinery, large equipment, complex logistics and detailed planning. But, in addition, we work with BIG DATA, augmented reality, artificial intelligence and much more,

generating great opportunities for the construction business.

In the ACS Group we use information models for construction in all our large projects, these combine real project data with information on organization, cost planning and life cycles of infrastructure. Thanks to the virtual reality all the elements of a planned construction can be checked before the work begins to be built, that is pure efficiency.

With augmented reality we go one step ahead. We can inspect a work in real time to see if all the processes have been carried out as planned, for example here, in The Spiral, one of the new skyscrapers that are being built in New York.

To combine all the new digital trends we have created Nextplore, our global innovation company. Nextplore develops digital innovation for construction, with professionals located throughout the world. One of the issues we are currently working on is the geolocation, collection and use of geological data.

Here on the A6 motorway in Heilbronn Germany, we have completed the initial test to collect photometry and laser scanning data using drones. In projects like this, precise calculations of earthworks are especially important. The real-time monitoring of the construction phases makes possible the exact measurement of the process and allows faster reaction times.

Our Nextplore colleagues in Minneapolis are developing the software and algorithms for this type of supervision. Believe me managing this large volume of information is a total challenge. Nextplore is collaborating with several universities, through these collaborations we are investigating new and innovative solutions.

Our Minneapolis colleagues are also processing geodata for other infrastructure projects, such as the large high-speed rail project in California.

Dragados and Flatiron, subsidiaries of the ACS Group, participate in construction works using state-of-the-art methods for their supervision, which allow reliable planning and great savings.

For us innovation is a shared process, so we have innovation teams in different centers around the world, one of these centers is located in Sydney. Here our subsidiaries Fimik and Dragados participate in the great construction project of the West Connex Highway. As you can see, most of the road will pass through tunnels below the city. The project aims to alleviate traffic, create jobs and bring the communities of this metropolis closer together.

The ACS Group is participating in new cooperation programs with different research institutes. Among them is the Watson MIT artificial intelligence laboratory in Massachusetts. Our connection with this institution implies that we can directly apply pioneering innovations in the field of artificial intelligence in our industry.

We are working closely with IBM to develop these solutions.

We also collaborate with the UMATIX startup that focuses on extremely precise location

technologies, which can be used both indoors and outdoors. The new robotic technology will allow to measure and accurately represent interior spaces in three dimensions without the help of GPS, while allowing precise navigation of the construction equipment.

[78. Integrated Sustainability Report 2022 – Committed to a Sustainable Future](#)

Integrated Sustainability Report 2023 Committed to a sustainable future Integrated Sustainability Report 2023 Committed to a sustainable future Integrated Sustainability Report - 2023 4 Contents 2 4 3 5 About us Performance in 2023 2025 Roadmap Ambition at the highest level 1 Chairman's letter 06 3.5 Materiality analysis 28 3.4 Sustainable Development Goals 26 2.1 Business model 14 2.2 Sacyr in the world 18 3.1 Strategic vision 22 3.2 Sustainability as a pillar: 2021-2025 Sacyr Sustainable Action Plan 23 3.3 Sustainability milestones 25 4.1 Key figures 32 4.2 Sacyr Group performance in 2023 34 4.3 ESG ratings and indices 41 4.4 European Union Taxonomy 42 5.1 Governing bodies 52 5.2 Innovation 61 5.3 Risk management 66 5.4 Regulatory compliance 80 5.5 Supply chain 90 5.6 Sustainable investment 95 5.7 Tax transparency 98 5.8 Cybersecurity 102 5 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6 8 7 Planet ambition Positive impact ambition Team ambition Appendices 6.1 Environmental commitment 106 6.2 Climate change 116 6.3 Circular economy 135 6.4 Natural capital 155 6.5 Sustainable cities 190 7.1 Professional development 202 7.2 Diversity, equity and inclusion 214 7.3 Safety, health and well-being 219 8.1 Social value 232 8.2 Sacyr social footprint 238 8.3 Stakeholders 242 Appendix I. About this report 250 Appendix II. Quantitative information 251 Appendix III. Traceability 278 Appendix IV. Reliability 296 9 Integrated Sustainability Report - 2023 6 1 Chairman's letter 7 Integrated Sustainability Report - 2023 1 Chairman's letter 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 2 About us 3 2025 Roadmap 4 Performance in 2023 Integrated Sustainability Report - 2023 8 Welcome to Sacyr's 2023 Integrated Sustainability Report. This document will show you how we have implemented our sustainability strategy and how our policies in this regard have had a tangible and measurable impact on our activities and projects. Thanks to the efforts of all of us here at Sacyr, this work has allowed us to fulfill our purpose of driving society towards a sustainable future by developing and managing infrastructure that generates a positive social, economic and environmental impact for the benefit of all our stakeholders. We provide you with this information in a transparent and balanced way, supported by the applicable regulations and widely-recognized reporting frameworks, and approaching the new requirements to be introduced in new EU-wide regulations on sustainability disclosures and new reporting standards. 2023 has been a challenging year, in which various armed conflicts have again placed us in an uncertain and difficult context for global economic activity, with the tragic added burden of the suffering of the societies involved. In this unfavorable context of high inflation and interest rates, we put our trust in the robustness and resilience of our business model and we have fulfilled all the goals we set ourselves for this year. In these changing times and as we reinforce our course as a company, we are keeping a close eye on a new and constantly-changing reality. The Board of Directors has continued to show strong leadership, mindful of all the new goals resulting from the divestment of the services business units. We have fast-tracked our process to reduce our recourse net debt by selling 100% of the Environment and Facilities business units, galvanizing a transformational shift that cements our position as one of the world's leading concession/P3 groups. This strategy is embodied by the growth in the value of our P3 assets as well as our increased operating cash flow. We have won new P3 contracts in key markets and, along with all of the above, we have achieved 1 Chairman's letter recognition in the form of an

improvement in our ranking in sustainability indexes and lists. As a sign of our commitment to improving our governance and effecting balanced management in all spheres of sustainability, we have strengthened our corporate governance by incorporating two independent directors. In this regard, in January 2023 Sacyr was listed in Bloomberg's Gender Equality Index (GEI), which measures companies' gender diversity performance. The publication of our Sustainable Financing Framework marked a new milestone in collaborative management between departments, created to foster the transparency, dissemination and integrity of environmentally and socially sustainable financing. Furthermore, Sacyr has just been included in the IBEX ESG index, an equity market sustainability index created to enhance transparency and measure Spanish companies' impact on sustainability. Sacyr is the most sustainable company in the infrastructure and construction sector in Spain, according to the Sustainalytics ESG Risk Rating assessment. As of June 2023, Sacyr is the top-rated company in the construction and engineering sector in Spain, for the second year in a row. Furthermore, S&P Global ranks Sacyr among the most sustainable companies in the infrastructure and construction sector worldwide. This year we obtained a score of 69 points, ranking Sacyr among the top five companies in the sector, and this improvement has earned us the Industry Mover badge. S&P Global included Sacyr in its Sustainability Yearbook for the third year running in 2024. Moreover, we have also achieved recognition from global environmental organization CDP for our leadership in transparency and how we perform in connection with climate change and water security. For 9 Integrated Sustainability Report - 2023 1 Chairman's letter 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 2 About us 3 2025 Roadmap 4 Performance in 2023 the second consecutive year, Sacyr featured in CDP's 'A List' of the world's top companies in this domain. This year we also renewed our water footprint certification and we are Water Positive thanks to our desalination facilities that generate more than 198 million cubic meters of water per year, bringing relief to areas of high water stress. Sacyr has the clear goal for 2025 of reducing its water footprint by 10%. In 2023, we celebrated the first year since our return to Spain's IBEX 35 benchmark stock market index. Since our return, our share value has increased thanks to the confidence of our investors and shareholders, as well as all the analysts who recommend buying Sacyr stock, in keeping with the improvement in Sacyr's share performance of more than 20% in 2023. Increasing shareholder remuneration has been among our priority goals, with a target return of around 5%. P3 assets, with a value of €3,254 million in December 2023, drive our strategy and already contribute 90% of EBITDA, approximately €450 million above the previous valuation we carried out for the October 2021 Investor Day. We continue to prove our capacity to bring new P3 projects into service, such as the Rutas del Este and Pedemontana-Veneta highways in Paraguay and Italy, respectively. Our commitment to international growth continues to develop as planned, as evidenced by the fact that 76% of revenues and 89% of the project backlog now come from abroad. The refinancing of the Pamplona-Cúcuta road project (Colombia) earned us the Bonds, Loans and ESG Capital Markets 2023 award to the Best Structured Financing of the Year, making it the largest social financing in volume of an infrastructure project in Latin America. I am equally proud of our investment of more than US\$890 million in the Ruta 78 highway in Chile, to which we have added the El Loa Airport P3 project in Calama, making Chile a key territory for our company's operations. In Spain we continue to grow and the Engineering and Infrastructure area is involved in such compelling projects as the expansion of Madrid's Museo del Prado. Also in Madrid, we have completed the new surgical unit at the Gregorio Marañón Hospital and the new hospitalization wing at the 12 de Octubre Hospital, one of the largest hospital projects in Europe. We ended 2023 determined to give a renewed push to our strategy to become even more P3-driven, boosting Sacyr's investment in the countries that are strategic to us, as part of an effort to considerably limit operational and

management risks. This year we will publish a new strategic plan for 2024-2027 to keep Sacyr on the path of value growth for our strategic stakeholders. As leaders in the sustainable infrastructure sector and as managers of a growing P3 asset portfolio, we continue to materialize our sustainable and innovative value creation proposition, contributing to the Sustainable Development Goals (SDGs) enshrined in the United Nations 2030 Agenda, having joined the UN Global Compact in 2007. Innovation is at the core of all our management processes, and these efforts have been rewarded by our receiving the Spanish National Innovation Award from Their Majesties the King and Queen of Spain, a recognition we are extremely proud of. Finally, I would like to reiterate my appreciation to all of Sacyr's employees for their hard work and dedication to the company's purpose. Thanks to their commitment, we will continue to overcome new challenges and advance towards an exhilarating future of sustainable growth. Thank you very much.

Manuel Manrique Cecilia Chairman and CEO Integrated Sustainability Report - 2023 10 2 About us 11 Integrated Sustainability Report - 2023 2 About us 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 3 2025 Roadmap 4 Performance in 2023 2.1 Business model 14 2.2 Sacyr in the world 18 Integrated Sustainability Report - 2023 12 Sacyr is a global infrastructure group listed on the IBEX 35 benchmark index of the Spanish stock exchange. We are present in more than 20 countries across four continents, where we implement high-impact innovative projects with considerable environmental, social, and economic value. Sacyr's activity is governed by our purpose and by six hallmark values that define us, guide us and shape our actions at every stage of our projects. Sacyr is a diversified company that leads sustainable solutions, working tirelessly for a more equitable, balanced and connected world. As industry leaders, we place the talent of our more than 15,000 employees at the service of progress and we invest every effort and all our passion to turn any challenge into a success. About us Mission Values Purpose Vision Of the regions where we are present, generating value for all our stakeholders. To develop infrastructure that fosters the well-being and sustainable development By developing and managing infrastructure that generates a positive social, economic and environmental impact for the benefit of all our stakeholders. To drive society forward towards a sustainable future Thanks to our innovative value proposition, our environmental commitment and our focus on the professional and personal development of a diverse workforce. To be a benchmark in infrastructure development Excellence Team spirit Flexibility Innovation Social commitment Environmental ethics 2 13 Integrated Sustainability Report - 2023 2 About us 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 3 2025 Roadmap 4 Performance in 2023 Our value creation model ROAD INFRASTRUCTURE SOCIAL AND HEALTHCARE INFRASTRUCTURE BUILDING DEVELOPMENTS INFRASTRUCTURE MAINTENANCE RAIL INFRASTRUCTURE UNIVERSITIES MULTI-MODAL HUBS AIRPORTS INTEGRATED WATER CYCLE WATER TREATMENT FACILITIES 2nd 3rd Largest transportation P3 company in the world Public Works Financing Largest infrastructure multinational in LatAM Engineering News-Record Private infrastructure investor in Chile and Colombia 1st Integrated Sustainability Report - 2023 14 2.1 Business model [2-6] [IF-EN-000.A] [IF-EN-000.B] [IF-EN-410B.1] [IF-EN-410B.3] [IF-EN-510a.1] In recent years, at Sacyr, we have redefined our company profile, based on a P3 business model that intervenes throughout the entire value chain of the infrastructure sector (transportation, social, renewable energy, water and singular building construction), from the tender, design and financing to the construction, operation and maintenance of assets. Following the divestment of our services units Valoriza Medioambiente and Sacyr Facilities, Sacyr has strengthened its position in two strategic businesses: Sacyr Concesiones Sacyr Engineering and Infrastructure. Sacyr Concesiones Our concession/P3 unit, the company's main strategic line of business, is based on the development and sustainable management of transportation infrastructures with low

demand risk (highways, railways, airports, transportation hubs) and social infrastructure (hospitals, universities). Likewise, this division leads the company's positioning in green business lines, a pillar of our corporate strategy, through a commitment to integrated water cycle and water treatment plant P3 projects (Sacyr Water). Sacyr Concesiones is the world's third-largest transportation infrastructure P3 company (Public Works Financing, August 2023), managing a diversified portfolio of 69 assets in countries such as Spain, Italy, the US, the UK, Australia, Portugal, Chile, Colombia, Brazil, Mexico, Peru, Uruguay, Paraguay, Algeria and Oman. Over the course of 27 years' history, Sacyr Concesiones has demonstrated its experience and technical expertise, as well as its financial capacity with around €20 billion in overall investments managed. With a remaining asset life of 26 years, the P3 division is configured as the lever for the company's future growth with a high potential for revalorization.

+4,500 +43 26 kilometers of highways and railways million passengers a year in hubs and airports remaining years of life of our assets hospital beds millions of residents served by Sacyr Water €M investment managed 2,700 9.5 ~20 15

Integrated Sustainability Report - 2023 2 About us 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 3 2025 Roadmap 4 Performance in 2023 Sacyr Engineering and Infrastructure Sacyr Engineering and Infrastructure is a leader in the construction of all types of civil works projects (highways, subway and railways, airports, maritime and hydraulic works), residential and non-residential buildings and industrial projects relating to renewable energy, water plants and oil & gas. Thanks to its solid experience of more than 37 years in complex projects, it is a strategic partner for Sacyr Concesiones, whose projects comprise more than 51% of its current revenue backlog.

+6,000 +10,000 +1,100 +300 48 stations 2 airports kilometers of highways and conventional roads beds available in 6 countries kilometers of high-speed and conventional rail projects executed 177 km executed 7 terminals Roads Hospitals 800,000 hours/year of capacity Engineering Railways Water Subway and tram In conservation services in Spain TOP 5 Sacyr Engineering and Infrastructure implements its projects in accordance with the principles of meeting deadlines, strict safety and quality standards, social and environmental commitment and focusing on innovation in all of its activities. In the wake of the restructuring following the divestment of the services units, from this year onwards Sacyr Engineering and Infrastructure will include the maintenance and conservation of roads and other singular infrastructure: dams, airports, ports and irrigation canals.

Integrated Sustainability Report - 2023 16 The success of our business model Our strategic approach underpins the company's stability and soundness through the development of long-term projects in consolidated markets, with low demand risk, which generate stable and recurring revenues that, in turn, finance the associated debt and generate cash for the Group. The vertical integration of the Sacyr Group's different lines of business allows us to generate value throughout a P3 project's life cycle, making us stronger and more competitive thanks to:

- An increased capacity to identify new opportunities through our in-depth knowledge of markets.
- Design optimization to improve cost efficiency over the projects' life time.
- Streamlining of time frames and costs.
- Financing capacity through structures that increase asset value.
- Appropriate risk allocation during the construction, operation and maintenance phases.
- Extensive experience in commissioning and managing assets and complex projects.
- Selective asset rotation.

Our strategic approach underpins the company's stability and soundness through the development of long-term projects in consolidated markets. Tlahuac Hospital. Mexico 17 Integrated Sustainability Report - 2023 2 About us 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 3 2025 Roadmap 4 Performance in 2023 P3 Engineering and Infrastructure Tender Finance Commissioning Operation and maintenance Design Build Refinancing Market intelligence Integrated Sustainability Report - 2023 18 2.2 Sacyr in the world [2-1] ALGERIA AUSTRALIA BRAZIL CANADA CHILE

COLOMBIA IRELAND ITALY MEXICO OMAN PARAGUAY PERU PORTUGAL SPAIN SWEDEN UNITED KINGDOM USA URUGUAY

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Three years ago, Sacyr entered a new era with our 2021-2025 Strategic Plan, reinforcing our focus on the P3-driven business model, hand in hand with a firm social and environmental commitment and making innovation the driving force for the transformation of our activity. In this period, Sacyr has cemented its position as a solid and reliable company with a clear vision of the future that promotes best practices in the sector, responding to the needs and demands of our multiple stakeholders. In fact, after just three years we have already achieved major milestones, such as entering the infrastructure market in Canada, winning our first P3 projects in the US, Brazil and the UK, as well as 3 2025 Roadmap 3.1 Strategic vision as strengthening our position in the US, UK, Italy, Chile, Colombia and Spain, balancing our portfolio geographically. From the financial standpoint, the Sacyr Group has also managed to achieve its main goals for 2025 ahead of schedule, such as those relating to revenues and EBITDA, as well as maintaining an attractive dividend policy. Moreover, one of the pillars of this Plan was to reduce recourse debt, significantly accelerating this process by divesting the environmental services and facility management subsidiaries. Accordingly, Sacyr is now reflecting on its upcoming strategic lines and eyeing an even greater ambition for the 2024-2027 period. 100% Sale of Valoriza Servicios Medioambientales 100% to Morgan Stanley Infrastructure Partners Sale of Sacyr €734 M Facilities to Serveo (€420 M in equity) €90 M (€90 M in equity) Jorge Chávez International Airport. Lima, Peru 23 Integrated Sustainability Report - 2023 3 2025 Roadmap 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 4 Performance in 2023 Team ambition Positive impact ambition People Communities Governance At Sacyr, sustainability is at the core of our decisions, weaving an ESG perspective into our activities and focusing on spheres in which the company can generate the greatest impact. For this purpose, we have an extensive and robust collection of corporate policies, under our Sustainability Policy Framework, which sets out the general principles and basic tenets that guide our action on sustainability. Furthermore, we have a sustainability strategy, our Sacyr Sustainable Action Plan, which is the roadmap for improving our ESG performance through 2025. Notably, this Plan and, in general, our sustainability commitments, have been validated by SGE21 certification, the leading European standard for auditing and certifying an ethically and socially responsible management system. To guarantee the application of the policies and the fulfillment of the established goals, we set up the Sustainability and Corporate Governance Committee, a delegate committee of the Board of Directors, and the Sustainability Committee, which are the most senior bodies responsible for ESG-related matters. The 2021-2025 Sacyr Sustainable Action Plan is structured around four ambitions (Planet Ambition, Team Ambition, Positive Impact Ambition and Ambition at the Highest Level), plus a fifth, crosscutting ambition: Sustainability Culture. Each of these ambitions entails specific goals and, to achieve them, we have established a series of actions, each gauged by indicators, to perform a robust monitoring that can be compared over time. 3.2 Sustainability as a pillar: 2021-2025 Sacyr Sustainable Action Plan Sustainability Action Plan • Climate change • Circular economy • Natural capital • Water • Sustainable cities • Security

• Good health and wellbeing • Professional development • Diversity and equity • Social contribution • Sacyr's social footprint • Stakeholders • Purpose and values • Governing bodies • ESG risk management • Regulatory compliance • Sustainable investment • Transparency • Innovation SUSTAINABILITY CULTURE Planet ambition Environment Ambition at the highest level Integrated Sustainability Report - 2023 24 Align our climate goals with the Science Based Target initiative (SBTi): • Reduce absolute Scope 1 and 2 GHG emissions by 42% (vs. baseline year 2020). • Reduce absolute Scope 3 GHG emissions by 25% (vs. baseline year 2020). • Be carbon neutral by 2050. Reduce our water footprint by at least 10% by 2025. Include biodiversity conservation targets in 100% of new contracts. Increase investment in environmental protection by 50% by 2025. Sacyr Zero Waste Plan: increase waste reuse by 80% by 2025. Team ambition Over the course of this report, we provide details of the goals and actions of each ambition. With regard to Sustainability Culture, the goal is to convey, promote and disseminate sustainability as a part of the organization's hallmark of identity. We therefore provide our employees with a number of awareness and training actions. The annual monitoring of the Sacyr Sustainable Action Plan is a key aspect for achieving our goals. Each area involved reports the extent of their progress in each of the actions to the Strategy, Innovation and Sustainability Department, which in turn reports the global progress to the Sustainability Committee and the Sustainability and Corporate Governance Committee. In December 2023 the global progress was 75%, indicating that we are steadily moving towards the complete fulfillment of the Plan, scheduled for 2025. Our goals Develop a corporate governance policy that is continuously updated in keeping with national and global best practices. Detect, assess, treat and control ESG risks in all business units and key projects. Double the investment in innovation by 2025, with a focus on sustainable projects. Use novel financing instruments linked to sustainability goals. Continuously adapt our regulatory compliance model to meet the highest standards of excellence in that sphere. Guarantee fiscal transparency in all our businesses and activities. Ambition at the highest level 1 2 4 5 6 3 Planet ambition Double the investment in social value projects by 2025. Implement certified systems for measuring social impact in 100% of new P3 contracts. Positive impact ambition 1 2 4 5 3 Increase the presence of women in leadership roles to attain 25% by 2025. Foster diversity through a firm commitment to hiring a range of profiles and nurturing an inclusive and safe working environment. Provide training to 100% of the workforce in connection with the environment, health and safety and innovation. Minimize the accident rate. 1 2 4 3 1 2 25 Integrated Sustainability Report - 2023 3 2025 Roadmap 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 4 Performance in 2023 3.3 Sustainability milestones Ambition at the highest level Planet ambition Positive impact ambition • We launched our Sustainable Financing Framework. • MSCI awarded us an "A" rating thanks to our commitment to ESG criteria and enhancing governance. • We entered the IBEX ESG index. • The Annual General Meeting approved the separation of the positions of Chairman and Chief Executive Officer into two separate executive roles by 2025. • Our compliance management system obtained ISO 37.301 certification and we were also certified to UNE 19.601 standard, which ratifies the company's adoption of best practices in anti-bribery and criminal compliance management. • We issued our social bond linked to an infrastructure project worth US\$400 million. • For the second consecutive year, we were the first company in the infrastructure sector to certify our water footprint to AENOR ISO 14.046 standard. • We aligned with the TNFD (Taskforce on Naturerelated Financial Disclosures) and we published our first Natural capital report. • We were included in CDP's climate "A List" for the second consecutive year, and we obtained a double "A" certification for our work against climate change and for water protection and security. • We certified our BIM to ISO 19650-1 and ISO 19650-2 standards, underpinning project development and further enhancing the quality of our works and assets. • We won

a Sustainability Award from AEDyR (Asociación Española de Desalación y Reutilización). • From the Sacyr Foundation we contributed more than €480,000 in social action through 70 collaboration agreements with third sector entities. • We were recognized in the TOP 20 Hospitals Awards in Spain. • We launched the 13th edition of the Sacyr Foundation Innovation Awards and the 6th edition of Sacyr iChallenges, focused on sustainability. • We took part in the UN Global Compact Working Group on Human Rights. • On October 26, the Madrid Food Bank Foundation recognized the Sacyr Foundation for our work with this NGO in the last few years. Team ambition • We were chosen as a TOP50 DIVERSITY COMPANY in Spain in the Variable D'24 report. • We broadened the scope of the companies certified to ISO 45001 Occupational Health and Safety Management Systems standard. • We launched Sacyr Women Community to foster and promote female talent and leadership. • Sacyr Construction was certified to SA8000 standard, evidencing its commitment to implementing the best labor conditions. • Sacyr Maintenance featured in the 5th Edition of the Occupational Risk Prevention Recognitions and Mentions for its prevention and best practices in connection with occupational road safety. • In Colombia we increased our Equipares certification to silver level. Integrated Sustainability Report - 2023 26 • Use of various innovative technological solutions that contribute to the decarbonization of cities. • Involvement in multi-business open innovation programs such as the European Commission's UELAC Digital Accelerator. • Launch of Innovision to identify business opportunities around emerging technologies. • Launch of InnoDay to create a learning space in which to enhance the development of innovation initiatives at the company itself. • Sacyr iFridays, inspiration sessions in which companies from different sectors share how they apply innovation and sustainability to their activities. • Development of 41 innovation projects, with the involvement of 367 employees. • More than €12.8 million invested in R&D+i, corresponding to 8.4% of net profit attributable to business in 2023. • 6th edition of the Sacyr iChallenges in which 205 proposals were received from 34 countries. • 12th edition of Fundación Sacyr's Innovation Awards. • For the second year in a row, we were the first company in the infrastructure sector to obtain AENOR certification of our Water Footprint to ISO 14,046 standard. • Optimization of water resources through Sacyr Water, using desalination to produce fresh water in areas of high or extremely high water stress. • Implementation of rainwater collection systems for subsequent use, using around 3,000 m3 of rainwater to water gardens in Carboneras (Almería). • Use of recycled or re-used water, representing 44.18% of our own consumption, thereby avoiding the consumption of 1,101,441 m3 of drinking water. • Development of a personalized water footprint calculator for our customers, subscribers, collaborators and employees. • For the first time, we obtained a double "A" certification from CDP, thanks to our rigorous and responsible management of water resources. • Sacyr Health program to foster employee well-being. • Sacyr Sports Club. • The "Health and Business" award from RRHH Digital, ranking Sacyr among the top 10 companies in terms of occupational health. • Training of 19,577 workers in occupational health and safety, for a total of 61,761 training hours. • Launch of the critical point auditing program. • Launch of innovation projects for improving user safety in our project sites. 3.4 Sustainable Development Goals We are aligned with the most ambitious global initiative for sustainable development, the United Nations 2030 Agenda, along with public and private entities, in pursuit of the same goal: to ensure sustainable development, leaving no one behind. All our actions are aimed at achieving the Sustainable Development Goals (SDGs). Through our initiatives, we aim to achieve the targets established in the SDGs. We have decided to focus mainly on seven of the 17 Goals included in the 2030 Agenda. However, as this report outlines, our actions are consistent with all of the SDGs. 27 Integrated Sustainability Report - 2023 3 2025 Roadmap 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 4 Performance in 2023 • In 2023, we established more than 70 collaboration agreements

with third sector entities. • We are in the main industry associations and we have strategic partnerships with universities, public administrations, intergovernmental organizations, NGOs and other companies that share our vision focusing on people and the planet. • We foster the development of public policies, especially in the environmental sphere, for example, by actively participating in COP28, collaborating in the European Commission's Environmental Policy Programme (2024-2029) or supporting the materialization of the Peruvian Pact for a Circular Economy. • Use of excavated material for various purposes at the works site or for others such as structural backfill or production of aggregates. • Use of sustainable concrete with a carbon footprint between 20-40% lower than a conventional product at the Hernani-Astigarraga Phase II and Elorrio joint ventures (Spain). • Slope stabilization by using around 3,600 kg of used tires in Concesionaria Vial Sierra Norte and Gestora de Servicios Viales (Peru). • Sacyr Zero Waste Plan, aiming to increase waste reuse by 80% by 2025. • In 2023, recycled materials represented 19.04% of the total material consumed. • 97% of construction and demolition waste recovered. • 97% of waste recycled, reused and recovered. • 497 low-emissions vehicles in our fleet. • Construction of 22 projects with sustainable certification in Spain, Canada, Chile and the United Kingdom. • Inauguration of Plaza de la Sustentabilidad in Santiago de Chile, a green area measuring 16,800 m² with low water use tree and shrub species. • We were recognized in the TOP 20 Hospital Awards in Spain. • We certified our BIM to ISO 19650-1 and ISO 19650-2 standards, underpinning project development and affording our works and assets greater quality. • Participation in the Forética Sustainable Cities 2030 initiative whose focus in 2023 has been the energy transition in cities. • First-time ISO 50.001 certification at water desalination plants internationally. • Installing 929 solar panels in Rota de Santa Maria (Brazil) that supply 100% of the consumption of the toll booths and public lighting. • Developing a proprietary methodology for the assessment of climate risks and opportunities, and their financial impact on the company. • Promoting carpooling at our headquarters. • Staging events with sustainability criteria throughout the value chain. • Decarbonization Plan, comprising more than 300 Sacyr projects worldwide. • €376,465 in R&D+i climate change-fighting projects. • 15.29% reduction of Scope 1 + 2 emissions. • 32% electricity consumed from renewable sources. • We featured on CDP's "A List" for the second year in a row in the climate category, obtaining a double "A" rating for our work against climate change and for water protection and safety. Integrated Sustainability Report - 2023 28 3.5 Materiality analysis [2-14] [2-29] [3-1] [3-2] To pinpoint the contents of this report, Sacyr starts with the most relevant sustainability topics resulting from a materiality analysis. This exercise was carried out from a dual perspective, taking an internal or financial approach (gauging how the environment affects our business) and an external or impact approach (gauging how our business affects the environment). Methodology 1 3 2 Identification of potential material topics Validation Issue prioritization Based on the initial list of potential topics identified through the analysis of various information sources, notably including international opinion leaders of reference, reporting frameworks, analysts, ESG agencies and vendors, as well as regulatory requirements in this area, a review of topics was carried out in 2023, incorporating those aspects that affect the company's broad context, such as macro trends and relevant geopolitical issues. Lastly, the resulting materiality matrix was validated by the main areas linked to sustainability and approved by the Sustainability Operating Committee. In the prioritization phase, all the topics identified were assessed, in accordance with the following approaches: • Internal assessment – Financial angle: The topics were prioritized on the basis of two assessment sources: - Internal working group, made up of the main areas of the company, which discussed the importance of each topic. - A literature review of future and emerging risks, and of the trends identified in 2023. • External assessment – Impact angle: In this case the assessment sources were: - Interviews with various stakeholders who shared their views through an

independent consultant, in order to obtain an objective result. - Bibliographic and media presence analysis. As a result, a materiality matrix was obtained with a prioritized list of the main material topics for the company. 29 Integrated Sustainability Report - 2023 3 2025 Roadmap 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 4 Performance in 2023 Materiality matrix In 2023, the "Climate change and energy efficiency" topic is still the most important aspect, along with "Ethics, compliance and integrity in business" and "Safety, health and well-being at work". Climate change and energy efficiency Ethics, compliance and integrity in business Safety, health and well-being at work Relations with analysts, investors and regulators Responsible and sustainable supply chain Good corporate governance Talent development Management of risks and opportunities Sustainable and resilient infrastructure Circular economy and efficient use of resources Human and labor rights Priority material topics Equity, inclusion and diversity among employees Management of water resources Relations with local communities Contribution to social development Customer satisfaction and safety, and quality products and services ESG financing Natural capital and biodiversity Environmental management Sustainable innovation and digitalization Cybersecurity and data protection 1 12 E S G 4 15 7 18 2 13 5 16 8 19 10 21 3 14 6 17 9 20 11 Impact angle – External assessment Financial angle – Internal assessment 1 9 8 17 20 18 14 2 3 12 19 21 4 7 6 10 11 16 13 15 5 Integrated Sustainability Report - 2023 30 4 Performance in 2023 31 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap 4.1 Key figures 32 4.2 Sacyr Group performance in 2023 34 4.3 ESG ratings and indices 41 4.4 European Union Taxonomy 42 Integrated Sustainability Report - 2023 32 4.1 Key figures 4 Performance in 2023 Our financial performance €4,609 Turnover million 76% International turnover EBITDA EBITDA from P3 assets EBITDA margin €1,523 million [+7%] 93% [+200bp] 33% [+430bp] Figures in € M 2022 2023 Turnover 4,977 4,609 International turnover 74% 76% EBITDA 1,428 1,523 EBITDA margin 29% 33% Net profit 111 153 Recourse net debt 546 269 *2022 figures have been restated to account for VSM and Facilities as discontinued operations. 2022* 2023 Net profit Operating cash flow €153 million [+39%] €848 million [+20%] Recourse net debt €269 million [-51%] 33 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap Turnover EBITDA €570 million* €2,734 million €2,158 million €940 million > Recourse net debt (million euros) > Engineering and Infrastructure revenue backlog (million euros) Contribution by business unit 2019 2020 2021 2022 2023 2021 2022 2023 RND % annual change Engineering and infrastructure backlog % annual change 848 836 681 546 269 6,280 7,354 7,456 -1% -19% -20% -51% 17.1% 1.4% Engineering and Infrastructure Engineering and Infrastructure P3 P3 * Including the assets of Pedemontana and A3 in Italy. Integrated Sustainability Report - 2023 34 4.2 Sacyr Group performance in 2023 Consolidated income statements (thousand euros) NET REVENUES 4,609,428 4,976,968 -7.4% Other operating income 241,635 267,182 -9.6% Total operating income 4,851,063 5,244,150 -7.5% External and operating expenses -3,327,798 -3,816,030 -12.8% EBITDA 1,523,265 1,428,120 6.7% Depreciation and amortization -159,669 -153,853 3.8% Change in provisions -113,060 -752 n.a. EBIT 1,250,536 1,273,515 -1.8% Financial profit/loss -719,463 -493,026 45.9% Exchange differences -11,904 -338,995 n.a. Share of profit from equity-method companies -17,684 2,159 n.a. Provisions for financial investments -104,045 -50,491 106.1% Gains on Financial instruments 37,392 89,998 -58.5% Gains on disposal of non-current assets 34,662 11,966 n.a. Profit/loss before tax 469,494 495,126 -5.2% Income tax -430,239 -160,840 n.a. PROFIT/LOSS FROM CONTINUING OPERATIONS 39,255 334,286 -88.3% CONSOLIDATED PROFIT/LOSS 350,234 342,982 2.1% Attributable to non-controlling

interests -197,012 -232,466 -15.3% NET ATTRIBUTABLE PROFIT 153,222 110,516 38.6% * 2022 figures restated to account for VSM and Facilities as discontinued operations. 2023 2022* %23/22 Lisbon Metro. Portugal 35 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap Consolidated balance sheet ASSETS (thousand euros) NON-CURRENT ASSETS 10,422,363 11,933,034 -1,510,671 Intangible assets 86,749 98,347 -11,598 P3 projects 1,514,656 1,520,034 -5,378 Property, plant and equipment 356,314 489,898 -133,584 Right of use on leased assets 131,760 204,683 -72,923 Financial assets 1,080,690 1,615,771 -535,081 Receivables from P3 projects 7,201,787 7,846,753 -644,966 Other non-current assets 41,369 52,281 -10,912 Goodwill 9,038 105,267 -96,229 CURRENT ASSETS 6,886,284 5,622,400 1,263,884 Non-current assets held for sale 1,581,239 11,648 1,569,591 Inventories 211,366 197,825 13,541 Receivables from P3 projects 1,077,099 1,187,209 -110,110 Receivables 2,221,921 2,365,251 -143,330 Derivative financial instruments 23,123 57,814 -34,691 Financial assets 91,168 74,560 16,608 Cash 1,680,368 1,728,093 -47,725 TOTAL ASSETS 17,308,647 17,555,434 -246,787 EQUITY AND LIABILITIES (thousand euros) EQUITY 1,750,021 1,358,413 391,608 Own equity 795,759 535,662 260,097 Non-controlling interests 954,262 822,751 131,511 NON-CURRENT LIABILITIES 9,229,825 11,758,464 -2,528,639 Financial debt 6,783,838 8,200,669 -1,416,831 Derivative financial instruments 22,550 119,412 -96,862 Lease obligations 117,189 146,501 -29,312 Provisions 135,457 197,361 -61,904 Other non-current liabilities 2,170,791 3,094,521 -923,730 CURRENT LIABILITIES 6,328,801 4,438,557 1,890,244 Liabilities linked to assets held for sale 1,378,509 0 1,378,509 Financial debt 1,395,840 1,092,322 303,518 Derivative financial instruments 29,995 2,080 27,915 Lease obligations 47,680 51,420 -3,740 Trade payables 2,280,794 2,152,507 128,287 Operating provisions 235,118 239,428 -4,310 Other current liabilities 960,865 900,800 60,065 TOTAL EQUITY AND LIABILITIES 17,308,647 17,555,434 -246,787 2023 2023 2022 2022 23/22 23/22 Integrated Sustainability Report - 2023 36 Flexible dividend Shareholder remuneration remains one of the Group's strategic pillars. Accordingly, Sacyr carried out a scrip dividend issue in February 2023, in which shareholders were given the opportunity to: i) sell Sacyr their rights at a guaranteed fixed price of €0.058, gross, per right; or (ii) receive 1 new share for every 45 existing shares. In June 2023 Sacyr paid out a second scrip dividend, in which shareholders were given the opportunity to: (i) sell Sacyr their rights at a guaranteed fixed price of €0.078, gross, per right; or (ii) receive 1 new share for every 38 existing shares. Post 2023 year end, the Group decided to pay out another scrip dividend, in which shareholders were given the opportunity to: (i) sell Sacyr their free allocation rights at a guaranteed fixed price of €0.062, gross, per right; or (ii) receive 1 new share for every 50 existing shares. Approximately 91% of Sacyr's share capital chose to receive company dividends in shares, demonstrating holders' trust in the company's securities. Sustainable financing framework In September 2023, Sacyr published its first Sustainable Financing Framework to integrate the sustainability strategy into the company's financing policy. The document incorporates all the types of sustainable financing available in the market and follows the principles established by the International Capital Market Association (ICMA) and the Loan Market Association (LMA) for green and social financial instruments, as well as sustainability-linked instruments, by means of a KPI. Redemption of the convertible bond In November 2023, Sacyr successfully launched an incentive offer with the aim of redeeming the €175 million convertible bond. Redemption of the convertible bond enabled Sacyr to minimize share volatility, eliminate short trading and reduce recourse net debt. Award of 2 P3 contracts: Via del Mare Highway (Italy) and Loa Airport (Chile) In October 2023, Sacyr took control of the operation and expansion of El Loa Airport in Calama, Chile. This €102 million project will increase the terminal's surface area three-fold, raising comfort and safety standards for users. In November 2023, Sacyr was awarded its fourth P3 project

in Italy, the new Via del Mare highway. This highway is expected to generate traffic revenue amounting to approximately €1.6 billion over the 32-year concession period. This road has an estimated average daily traffic rate of 36,000 vehicles. Derivative on own shares After year end, in January, Sacyr entered into a forward contract with a credit institution on 10 million ordinary Sacyr shares at a price of €3.044, adjustable in accordance with the final strike price, and with a maturity of one year. This transaction may be settled by physical delivery of shares or by differences, according to Sacyr's preference.

2023 Highlights

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2 About us

3 2025 Roadmap

Sale of VSM and Sacyr Facilities In October 2023, Sacyr completed the sale of 100% of its services unit, Valoriza Servicios Medioambientales to Morgan Stanley Infrastructure Partners. The proceeds received by Sacyr from the sale amounted to €420 million, and the enterprise value, including equity and debt, amounted to around €734 million. In December 2023, Sacyr completed the sale of Sacyr Facilities to Serveo. The final transaction price was €90 million for 100% of the shares of Sacyr Facilities. Sacyr could receive up to an additional €15 million depending on the success of ongoing claims. Commissioning of Pedemontana (Italy) and Rutas del Este (Paraguay) In July, the Rutas del Este highway in Paraguay entered operation, following an investment of US\$520 million. The project included the construction of bypasses, doubling, improvement, operation and maintenance of the road, with an impact on 11 municipalities in three departments of Paraguay. In December 2023, Sacyr Concesiones placed into service the final section of the Pedemontana – Veneta Highway, in Italy. This P3, jointly owned by Sacyr and Fininc, is tasked with the design, construction and financing, as well as the operation and maintenance of the highway for a period of 39 years as from construction completion. Rotation of non-strategic assets In May 2023, Sacyr, through Sacyr Concesiones, agreed to sell a 49% minority stake in the ERESMA Highway (Spain) to the consortium made up of GED Infrastructure and CASER Seguros. The divestment amounted to a total of €69 million, including the debt associated with the shareholding. In September 2023, Sacyr Concesiones completed the sale of its 45% stake in the N6 highway in Ireland to Bestinver Infra. This transaction, announced in May, amounted to €45 million, including the debt associated with the stake sold. Sacyr was awarded its 1st transportation infrastructure P3 in the US: the I-10 Highway in Louisiana In July 2023, Sacyr Concesiones, was chosen along with Acciona and Plenary Americas to implement a 10-kilometer section of the I-10 highway in Louisiana that includes an iconic bridge over the Calcasieu River. This project, worth US\$2.1 billion (€1.9 billion) will link the cities of Lake Charles and West Lake, in south-western Louisiana, and includes the design, build, finance, operation and maintenance of this infrastructure for 50 years. Subsequent to year end, in February the consortium signed the commercial completion of the P3 agreement with the Louisiana Department of Transportation and Development.

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38 Share price

Financial analysts

Fourteen analysis firms actively tracked Sacyr's share price. 14 of the 14 analysts recommended "buy". In other words, 100% of the analysts recommend buying shares in the company. The closing price for the year was €3.126 per share, implying upside potential of 22%, since the average target price among the analysts' consensus was €3.81 per share. In 2023, the share price reached an intraday high of €3.182 on December 20, while its closing high was €3.17, reached on July 4. Conversely, the share price reached an intraday low of €2.596 on January 19, and a closing low of €2.620 on October 27.

Buy Hold Sell 100% 64% Sacyr 29% 7% Sector average

Stock Market information

Year	2023	2022	% 23/22	Year end	€3.13	€2.60	20.4%	Closing high	€3.17	€2.69	17.8%	Closing low	€2.62	€1.88
Market capitalization (thousands of euros)	1	2,135,320	1,699,016	25.7%	Annual trading volume (thousands of euros)	1	1,670,754	1,380,128	21.1%	Average daily trading volume (no. of shares)	1	2,249,137	2,284,805	-1.6%
No. of shares admitted for trading at year end	683,083,887	653,467,691	4.5%	Nominal										

share value 1 EURO 1 EURO For more stock market information: Information • Stock market information Sacyr > Stock market indices 2023 2022 % 23 vs 22 1 Source: Bolsas y Mercados Españoles (BME). €3.170/share July 4 €3.182/share December 20 €2.620/share October 27 €2.596/share January 19 Closing high Intraday high Closing low Intraday low 39 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap 1 Investment amount. 2 Backlog amount. Performance by business unit €2,158 million [+10%] Turnover €940 million [+7%] EBITDA 26 years Remaining asset life 69 No. of assets €220 million [+9%] Distribution of P3 assets 62.6% [-181bp] EBITDA margin 2 1 3 €1,600 M2 €546 M2 P3 3 2 DBFOM of the new Via del Mare Highway in the Veneto Region for a period of 32 years. O&M P3 contract at the El Loa International Airport in Calama (Chile) for a 15-year period. Design, build, financing, operation and maintenance of a 10 km section of the I-10 highway for 50 years, including the construction of a bridge linking Lake Charles and West Lake, Louisiana (USA). €1,900 M1 1 Integrated Sustainability Report - 2023 40 Construction of the Tram network (sections A, B and C) in the city of Palermo, in Sicily (Italy). Construction of 4 solar photovoltaic plants, with a total installed capacity of 200MW, in Badajoz. €2,734 million [-14%] Turnover €7,456 million [+1%] Work backlog 33 months of activity €570 million [+10%] EBITDA Activity 1 2 3 4 Engineering and Infrastructure €560 M1 €57 M1 3 Study, design and construction for the restoration of degraded ecosystems of the "Canal del Dique" in Colombia. €103 M1 4 Construction of El Loa International Airport in Calama, Chile. Modification of Route 5 north, "Vallenar – Caldera" section, in Chile. €316 M1 €54 M1 €137 M1 €102 M1 €262 M1 1 2 Railway project to integrate the AVE high speed railway in Almeria. Construction of various urban developments in Spanish towns, and for renowned real estate developers. €80 M1 €83 M1 A-32 Linares-Albacete Highway, section linking with CM313 Balazote Oeste. Construction of the new section of Line 8 of the FGC (Ferrocarriles de la Generalitat de Catalunya) metro system from Gràcia to Plaza de España (Barcelona). Extension of the Catania (Sicily) railway network, section: "Misterbianco – Paterno", in Italy. 21% [+448 bp] EBITDA margin 1 Backlog amount. 41 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap Sacyr is the most sustainable company in the infrastructure and construction sector in Spain. In June 2023, we achieved a score of 19.7 (low risk) in the Sustainalytics ESG Risk Ratings. This means we rank as follows: • 1st in Spain for the third consecutive year in the Construction and Engineering sector. • 4th place in the Construction and Engineering sector in Europe. • 1st place among international companies with a market capitalization of between US\$1.9 billion and US\$2 billion in the sector. In early 2024 Sustainalytics awarded us its "Industry Top-Rated" badge, recognizing Sacyr as one of the topperforming companies in our industry. CDP awarded us a double "A" score. Carbon Disclosure Project (CDP) awarded us a double "A" score for our leadership in corporate transparency and our performance in connection with climate change and water security, ensuring we feature on their annual "A List". As a result, we are one of a handful of companies that have obtained this double "A" score out of more than 21,000 rated businesses. In October 2023, Sacyr joined the BME ESG Index. This is a new index created for Spanish companies belonging to the IBEX 35 and IBEX Mid Cap indexes that excel in their sustainability performance. To be included in this index, companies must obtain a score of at least "C+" in the Inrate assessment and must be members of the United Nations Global Compact. MSCI has awarded us an "A" score in its "Construction & Engineering ESG Rating" index, improving our score with respect to previous years and highlighting our practices in connection with governance. 4.3 ESG ratings We got an ESG Score of A from Refinitiv, and rank 6th in Spain and 3rd in the construction sector in terms of diversity and inclusion. In 2023 we were included in the Bloomberg Gender

Equality Index. In this edition, which rates 484 companies (23 of them Spanish) from 11 different sectors, we obtained a score of 75.5, placing us in the top 3 in the Energy and Construction sector. We have been listed on FTSE4Good since 2015. In 2023 we obtained a score of 3.7 out of 5, placing us in the 87th percentile in the “Construction and Materials” sector. We have been included in the S&P Sustainability Yearbook 2024, featuring companies with the best practices in sustainability in the sector. We obtained 69 points in S&P Global’s “Corporate Sustainability Assessment”, increasing our score with respect to last year, placing us in the 99th percentile and in the top 5 of Construction and Engineering companies. We also received the Industry Mover badge, in recognition of having increased our score by more than 5% compared to the previous year, and we were the company to achieve the largest score increase in the sector. Standard Ethics has included Sacyr in its sustainability index, the SE Spanish Index, leaving behind the SE Mid Spanish Index, which we first joined in October 2022. The SE Spanish Index is made up of 40 large-cap Spanish listed companies. We obtained the Ecovadis Platinum Medal for our construction projects. The Engineering and Infrastructure business was awarded the Platinum medal by Ecovadis, receiving a global score of 78 points, placing us in the 99th percentile. Integrated Sustainability Report - 2023 4.2.4 European Union Taxonomy At Sacyr, we have been using the EU Taxonomy since its entry into force in 2021 as a driver allowing us to progress in the transformation of our business model, while at the same time responding to the reporting requirements deriving from Regulation (EU) 2020/852, as an example of communication and transparency with our stakeholders. Due to the EU Taxonomy being implemented gradually, the disclosure of eligibility for the four environmental goals that were in the process of being defined by the European Commission have been added to the information referring to the 2023 period, in addition to the reporting obligations of the previous year (eligibility and alignment for the Climate Change Mitigation and Adaptation goals). These are: sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems, as outlined in the Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023. The latest legislative developments in 2023 introduced new activities to the climate change mitigation and adaptation goals already defined and approved: activities 3.18 through 3.21 and 6.18 through 6.20 of Annex I (Climate Change Mitigation) and activities 5.13, 7.8, 8.4, 9.3, 14.1 and 14 of Annex II (Climate Change Adaptation). The transversal working group set up by Sacyr to implement the Taxonomy requirements has continued analyzing and interpreting the new application criteria in order to extend them to other Group activities. Notably, in 2023 the European Commission published explanatory notes (Frequently Asked Questions or FAQs) that do not introduce additional criteria leading to changes in the assessment of the Sacyr Group's main eligible activities, so the interpretations made by the Group to date remain in force. However, as any new guidelines, amendments or developments to the European Taxonomy are published that may have an impact on these interpretations made by Sacyr, this information would be restated for subsequent years. Accounting metrics Once more, and in accordance with Delegated Regulation (EU) 2021/2178 on disclosure of Taxonomy information, the accounting criteria to be taken into account when calculating the numerator and denominator of eligible and ineligible net turnover, CAPEX and OPEX under the EU Environmental Taxonomy have been considered. To calculate the ratios of the three financial KPIs, the proportion of net turnover, CAPEX and OPEX considered eligible by Taxonomy has been calculated as the numerator, divided by the total turnover, CAPEX and OPEX of the Sacyr Group at year-end. • Turnover. The proportion of turnover referred to in Article 8(2)(a) of Regulation (EU) 2020/852 has been calculated as the share of net turnover derived from products or services, including intangibles, associated with economic activities that comply with the taxonomy (numerator), divided by net turnover (denominator) as defined in Article

2(5) of Directive 2013/34/EU. Turnover also includes revenue recognized in accordance with International Accounting Standard (IAS) 1, paragraph 82(a), as adopted by Commission Regulation (EC) No 1126/2008. In the case of Sacyr, turnover is shown in note 28 of the Consolidated Annual Financial Statements. • CAPEX. The CAPEX ratio referred to in Article 8(2) (b) of Regulation (EU) 2020/852 covers additions to tangible and intangible assets during the relevant financial year before depreciation, amortization and any revaluations, including those resulting from revaluations and impairments, for the relevant financial year, excluding changes in fair value. This calculation also includes additions to tangible and intangible assets resulting from business combinations. In the case of Sacyr, these additions are reflected in note 5 Property, Plant and Equipment, note 6 Leases, note 7 P3 Projects and note 8 Other Intangible Assets of the Consolidated Annual Financial Statements. 43 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap • OPEX. The OPEX ratio referred to in Article 8(2)(b) of Regulation (EU) 2020/852 restricts the calculation of this KPI to non-capitalized direct costs that relate to research and development, building renovation measures, short-term leases, maintenance and repairs, as well as other direct costs related to the day-to-day maintenance of property, plant and equipment assets, by the company or a third party to whom activities are outsourced, and which are necessary to ensure the continuous and efficient operation of those assets. In addition to these items, leasing costs shall be computed by non-financial corporations that apply national GAAP and do not capitalize right-of-use assets. As in previous years, the OPEX calculation was not included as part of the report, as the direct costs considered by the Regulation (€162,737.28 thousand in 2023) are not material for our businesses compared to the total operating costs for the year (€3,606,509.86 thousand in 2023). Consequently, OPEX data are not reported in the relevant table in Appendix II. Quantitative information - Information concerning Taxonomy. Eligibility analysis and alignment of Sacyr Group activities As previously mentioned, this year's report broadens the consideration of eligible activities that have a potentially substantial contribution to the four new environmental goals. The eligibility and alignment of the climate goals are maintained. Consequently, based on the Taxonomy classification carried out in the previous year, a comprehensive review was conducted to assess new evidence to determine whether eligible activities from the previous year are aligned with the climate goals (Annexes I and II of the Delegated Regulation on Climate), and also to analyze how the activities included in the new environmental goals match the activities carried out by Sacyr. Although in previous years activities were identified that could contribute to both the Climate Change Mitigation and Adaptation goals, the approval of new Taxonomy activities increases the possibility for such cases to co-exist, and it is necessary to avoid double accounting in the calculation of financial metrics. Consequently, given the potential additional developments of the regulation, or future clarifying documents on the interpretation of certain criteria for considering as eligible the activities described in the four new environmental goals, a prudent approach has been taken, whereby only those activities whose degree of certainty allowed a better fit with climate objectives have been classified under the new goals. Such cases were identified in activities linked to the goal of sustainable use and protection of water and marine resources, as part of the main activities carried out by Sacyr Water, as described below. When reporting requirements increase next year with the disclosure of the alignment of all environmental goals, it will be possible to more comprehensively reassess potential reclassifications that may arise in this regard. Integrated Sustainability Report - 2023 44 Minimum social safeguards With regard to Minimum social safeguards, a compliance review was carried out during the reporting year, which, as in the previous year, was conducted at the Sacyr Group level. Existing human rights risks are identified and the necessary mitigation actions are

implemented. In this regard, the Human Rights Policy and Code of conduct underpin Sacyr's commitment to complying with current legislation on social topics in all the regions where we operate. Furthermore, we extend this commitment to the value chain by promoting best practices among contractors, subcontractors and suppliers. In addition, we actively take part in numerous international initiatives such as the International Labour Organization's Tripartite Declaration, the OECD Guidelines and the United Nations Universal Declaration of Human Rights. There have been no finalized legal proceedings in 2023 resulting in convictions for human rights breaches, corruption or bribery, tax evasion or competition law infringements. This year we obtained two new certifications, ISO 37001 anti-bribery management system standard and UNE 19601 criminal compliance management system standard. Likewise, with the aim of anticipating future regulatory developments in this regard, the Sacyr Group is working to strengthen our due diligence process in line with future requirements, which will also allow us to develop our response to compliance with minimum social safeguards according to the Taxonomy. Finally, the Policy regarding Anti-corruption and Relations with Public Officials and Authorities, the Corporate tax policy and the Regulatory compliance, crime prevention and fair competition model allow us to cover the minimum social guarantees required by the Taxonomy for the four fundamental pillars: human rights, corruption, taxation and fair competition. For more detailed information, see section 5.1.5 Corporate governance system. Uruguay Central Railway. Uruguay 45 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap Substantial contribution The Sacyr Group's eligible activity for the Climate Change Mitigation and Adaptation goals was assessed in accordance with substantial contribution criteria. The results are detailed in Appendix II, which provides quantitative information related to the Taxonomy. To conduct this assessment, the technical selection criteria for each eligible activity were applied, assessing and providing evidence of their compliance if applicable. In this context, Sacyr's main activity may be classified into the following sectors: Objectives Taxonomic activities Activities carried out by the Sacyr Group ENERGY Climate change mitigation 4.1.Electricity generation using solar photovoltaic technology. Through Sacyr Engineering and Infrastructure and Sacyr Concesiones, we design and operate projects harnessing various technologies for the generation of renewable energy (biomass plants, solar farms, photovoltaic plants, etc.) and the construction and maintenance of electrical substations. 4.3.Electricity generation from wind power. 4.6.Electricity generation from geothermal energy. 4.8.Electricity generation from bioenergy. 4.9.Transmission and distribution of electricity. WATER AND WASTE Climate change mitigation 5.1.Construction, extension and operation of water collection, treatment and supply systems. Through Sacyr Water and its subsidiaries, we develop projects for the design, construction, renovation and maintenance of wastewater treatment facilities (WWTPs), drinking water treatment plants (DWTPs), distribution networks and sewerage. In addition, we conduct desalination activities and projects related to flood risk management. 5.3.Construction, extension and operation of waste water collection and treatment. 5.8.Bio-waste composting. Climate change adaptation 5.13.Desalination. 14.2.Flood risk prevention and protection infrastructure. Sustainable use and protection of water and marine resources 1.1.Manufacture and installation of leak control technologies to reduce and prevent leaks in water supply networks and associated services. 2.2.Urban wastewater treatment. TRANSPORTATION Climate change mitigation 6.4.Operation of personal mobility devices, cycle logistics. This is one of the Group's main eligible activities. Through companies such as Sacyr Construction and its subsidiaries in Chile, Colombia and the United Kingdom, we carry out initiatives pertaining to the design, construction, commissioning, operation, maintenance and renovation of various kinds of infrastructure (roads, railways, airports, ports, interchanges, etc.). 6.13.Infrastructure for personal

mobility, cycle logistics. 6.14. Infrastructure for rail transport. 6.15. Infrastructure enabling low-carbon road transport and public transport. 6.16. Infrastructure enabling low-carbon water transport. 6.17. Low-carbon airport infrastructure. CONSTRUCTION AND REAL ESTATE DEVELOPMENT Climate change mitigation 7.1. Construction of new buildings. Through various companies we undertake the construction of all types of buildings, both singular (hospitals, universities, logistics centers, etc.) and residential. 7.2. Renovation of existing buildings. 7.3. Installation, maintenance and repair of energy efficiency equipment. 7.6. Installation, maintenance and repair of renewable energy technologies. Integrated Sustainability Report - 2023 46 Do No Significant Harm (DNSH) to the environment (2) DNSH to climate change adaptation: We have assessed the eligible activities pursuant to the guidelines provided in Annex A of Delegated Regulation (EU) 2021/2139. These screening criteria apply to compliance with both substantial contribution to climate change adaptation and to ensure Do No Significant Harm (DNSH) provisions to climate change adaptation compliance by the eligible economic activity analyzed. In 2022, we devised a 2022-2027 Adaptation Plan envisaging solutions to tackle climate material risks for each economic activity. This assessment of climate vulnerabilities and risks consisted of analyzing acute and chronic physical climate risks (PCRs) that might affect the activity. The assessment of climate vulnerabilities and risks is based on three main stages: Analysis of the activity: examining the acute and chronic physical climate risks (PCRs) that might affect the economic activity's performance over the course of their scheduled duration. Assessment of climate vulnerabilities and risks: determining, firstly, the degree of exposure of the economic activity to the risk, linking each PCR with the various climate variables provided by the Intergovernmental Panel on Climate Change (IPCC). Once the PCRs that might affect the performance of the activity have been identified, the next step is a detailed analysis of the risk level, capacity for adaptation or resilience, and vulnerability of each asset. Assessment of adaptation solutions: examining the climate-related hazards identified as material for each economic activity that is vulnerable. For more information on Sacyr's performance, see chapter 6.2 Climate change. (3) DNSH to sustainable use and protection of water and marine resources: Projects considered to be eligible and aligned have demonstrated that they comply with the criteria set out in Appendix B of Annex I of the Taxonomy. For projects legally obliged to conduct environmental impact assessments (EIA), compliance was verified with the measures specified in the impact statement or environmental monitoring plan to guarantee prevention, mitigation and the adequate approach to potential impacts on water and marine resources. Furthermore, environmental management systems ensure compliance with legal standards linked to water, and Sacyr has a Corporate Water Policy, approved by the Board of Directors, which reflects our commitment to responsible water management. (4) DNSH to transition to a Circular Economy: In accordance with the Taxonomy-eligible activities, the applicable circular economy DNSH criterion has been assessed. Aligned projects have been proven to comply with the specific waste management measures detailed in the environmental impact assessment monitoring plans or on-site waste management plans, or with criteria such as CDW prepared for reuse or recycling being above 70%. A significant percentage of the aligned projects are governed by an environmental management system certified to ISO 14001 standards. (5) DNSH to pollution prevention and control: The criteria provided in Appendix C of Delegated Regulation (EU) 2021/2139 for activities falling into groups 7.1 and 7.2 were fulfilled through the Buy Green Recommendations Guide and the environmental management systems. (6) DNSH to protection and restoration of biodiversity and ecosystems: Eligible and aligned projects have been shown to be compliant with the criteria provided in Appendix D of Annex I of the Taxonomy. Furthermore, in projects with a legal requirement to conduct impact assessments (EIA), compliance with the measures outlined in the impact statement or environmental monitoring plan has been proven to

ensure that potential impacts on biodiversity and ecosystems are avoided, mitigated and adequately addressed. In addition, environmental management systems guarantee compliance with legal standards linked to biodiversity, and Sacyr has a Biodiversity Policy that establishes our approach and commitment to biodiversity conservation and protection. 47 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap 2023 RESULTS The analysis shows that 91.58% of the Sacyr Group's turnover and 78.34% of its CAPEX are eligible and 33.66% of its turnover and 13.60% of the CAPEX are Taxonomy-eligible and aligned. Eligible Non-eligible Eligible and aligned Eligible and non-aligned 33.7% 8.4% 91.6% 57.9% 13.6% 21.6% 78.3% 64.7% > Turnover > CAPEX €4,609,428 thousand €280,630 thousand Eligibility Alignment Alignment Eligibility Integrated Sustainability Report - 2023 48

Consistent with previous years, the figures reported confirm the outstanding potential of our business model, present in key sectors for the global economy, and highlight its capacity to meaningfully contribute to reducing greenhouse gas (GHG) emissions. This commitment is materialized through alignment, emphasizing the contribution of Sacyr Group activities to climate change mitigation and, to a lesser extent, to climate change adaptation activities and water resources. In detail, the tables in Appendix II show the breakdown of turnover and CAPEX, for the construction works, projects and business activities that are supported by the activities listed in Annexes I and II of Taxonomy Delegated Regulation 2021/2139 for the Climate Change Mitigation and Adaptation goals, and those of Annexes III-VI Taxonomy Delegated Regulation 2023/2486 for the four non-climate goals. As previously mentioned, the lack of materiality of operating expenses in our business model means that OPEX is not reported. In this sense, although in 2023 the main companies in the Services Unit (urban services, facilities and social) were sold, as shown in the Taxonomy reporting tables in Appendix II, the data for 2022 are maintained. Consequently, the comparison of figures for 2023 and 2022 shows a significant improvement in the turnover eligibility data (91.6% in 2023 compared to 84.1% in 2022) while the proportion of eligible and aligned activities decreases (33.7% in 2023 compared to 36.8% in 2022) for the same indicator, as a result of the changes in the consolidation perimeter of the Sacyr Group. With regard to CAPEX, the exceptional increase in the previous year of the total figure for this KPI, as a result of substantial investments in road P3 projects, normalized the proportion of eligible and aligned, eligible non-aligned and non-eligible CAPEX this year. According to the Taxonomy categorization of these P3 projects, registering a lower proportion of eligible and non-aligned CAPEX explains the decrease in eligibility (78.38% in 2023 compared to 87.88% in 2022) and the increase in alignment (13.64% in 2023 versus 8.49% in 2022) with respect to the previous year. Hernani-Astigarraga Phase 2. Spain 49 Integrated Sustainability Report - 2023 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 1 Chairman's letter 2 About us 3 2025 Roadmap Furthermore, activities like the collection and transportation of non-hazardous waste, recovery from non-hazardous waste or social care services (activities 5.5 and 5.9 of the Mitigation goal and 12.1 of the Climate Change Adaptation goal, respectively), exclusive to the Services division, are no longer represented in the figures reported for 2023. Consistent with the various national and European sector groupings, the Sacyr Group continues to apply the following considerations due to the interpretability of the eligibility descriptions in the Delegated Acts published: • Integrated water cycle projects that include water collection, purification and distribution (taxonomic activity 5.1) and waste water collection and treatment (taxonomic activity 5.3), in order to avoid false accounting, have been included in taxonomic activity 5.1 or 5.3, depending on which is the main activity of the work/project and/or service. • Activity 6.15, associated with Infrastructure enabling low-carbon road transport and public transport, has been considered eligible because of its potential to contribute to

climate change mitigation by facilitating the transport of zeroemissions vehicles and incorporating solutions to significantly cut emissions from polluting vehicles. In this regard, inclusion of the qualifier "low-carbon" , as also included in other taxonomic activities such as 6.16. and 6.17., will determine the fulfillment of the technical selection criteria to gauge whether the activities are aligned, but is not a condition for assessing eligibility per se. This approach was used for the analysis in previous years and was maintained for this year's eligibility screening. It is important to emphasize that the ongoing development of the standards, potential regulatory changes, clarifications or implementation guidelines might lead to a modification of our current analysis. In such an event, Sacyr would update the results stated for 2023 accordingly.

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Integrated Sustainability Report - 2023 52 Ambition at the highest level 5.1 Governing bodies 5 Our corporate governance practices are aimed at ensuring that the company is properly run, promoting the engagement of all shareholders and the exercise of their rights, and reporting to all stakeholders with the utmost transparency on Sacyr's operations, economic and financial situation, and environmental, social and corporate governance (ESG), in order to maximize the company's sustainable value in accordance with its Purpose, Mission, Values, Vision and Principles. The percentage of compliance with Good Corporate Governance guidelines that apply to Sacyr is 93.33%. [2-9] [2-13] [2-16] The Annual General Meeting is the highest decisionmaking body in which all the company's shareholders, duly convened, meet to decide on the matters in their sphere of competence, pursuant to legislation in force. Sacyr's Articles of Association promote the engagement and participation of shareholders at the AGM, do not establish any limit on shareholders' voting rights, and provide for their in-person or online presence at the meeting, as well as allowing them to vote remotely. Furthermore, the Annual General Meeting is the main forum for Sacyr to exchange information with its shareholders and other stakeholders. In addition, we have other information channels such as an online forum, the corporate website, the Investor Relations Department, and several e-mail addresses which shareholders and investors may use to communicate with us. [2-9] [2-10] [2-11] [2-12] [2-13] [2-14] [2-16] [2-17] [2-18] [405-1] The Board of Directors, Sacyr's most senior decisionmaking body except for in those matters reserved for the Annual General Meeting, promotes the corporate interest, managing and representing the Company. As of December 31, 2023, Sacyr's Board of Directors comprises fourteen directors (one executive, five proprietary, seven independent and one external) who together possess a range of expertise, competences, backgrounds, races, ethnicities, cultures, experiences and genders that ensure the proper functioning of the Board in keeping with national and international good governance practices. In the wake of the appointments to the Board in 2023, 50% of directors are now independent; while the percentage of executive and external directors has decreased to 7% each; and that of proprietary directors to 36%. The number of women on the Board of Directors has also increased, from 23% to 29%, and the Company has pledged to reach at least 40% female representation by 2025. Lastly, the Company has also announced its commitment to splitting the currently combined Chairman and Chief Executive Officer roles into two separate positions by 2025. The Board of Directors has a lead director and a director responsible for cybersecurity. Sacyr has a Policy for the Selection, Appointment and Re-election of Directors, approved by the Board of Directors and in a continuous process of improvement, to ensure that the selection process and subsequent proposals for appointment or re-election of directors comply with the principles of transparency and objectivity, and

that they are in keeping with the needs of the Board and the Company. 5.1.1 Annual General Meeting 5.1.2 Board of Directors 53 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

Over the course of 2023, the Board of Directors and its Committees conducted their activities in keeping with their competences, with the Board meeting 9 times, the Executive Committee 10 times, the Audit Committee 10 times, the Sustainability and Corporate Governance Committee 4 times and the Appointments and Remuneration Committee 5 times. Likewise, all the directors attended all the meetings of the Board of Directors, either in person or by proxy with specific instructions. The Board of Directors evaluates its operation and that of its Committees on an annual basis, for which purpose it has commissioned the support of an external independent consultant of widely-recognized prestige for the sixth consecutive year. As a result of the evaluation, the Board annually agrees an improvement plan which is implemented over the course of the following year.

Name / Position Representative Directorship Representing Manuel Manrique Cecilia Chairman and CEO Executive Demetrio Carceller Arce First Vice-Chairman Proprietary Disa Corporación Petrolífera S.A Elena Jiménez de Andrade Astorqui Lead Director Independent José Manuel Loureda Mantiñán Director Proprietary Prilou, S.L. Grupo Corporativo Fuertes, S.L. Director Tomás Fuertes Fernández Proprietary Grupo Empresarial Fuertes S.L. Francisco Javier Adroher Biosca Director Proprietary Disa Corporación Petrolífera S.A. Juan María Aguirre Gonzalo Director Independent Augusto Delkader Teig Director Independent María Jesús de Jaén Beltrá Director Independent Luis Javier Cortés Domínguez Director Other external José Joaquín Güell Ampuero Director Independent Raimundo Baroja Rieu Director Proprietary Disa Corporación Petrolífera S.A. María Elena Monreal Alfageme Director Independent Adriana Hoyos Vega Director Independent Ana María Sala Andrés Non-Director Secretary Alfonso Aguirre Díaz-Guardamino Non-Director Vice-Secretary All Sacyr Group directors are over 50 years of age.

Integrated Sustainability Report - 2023 54 5.1.2.1 Committees The Board of Directors has three Delegate Committees (the Sustainability and Corporate Governance Committee, the Audit Committee and the Appointments and Remuneration Committee) on which only external directors serve. Their activity is in line with the competences provided by applicable legislation and the Company's internal regulations. The Sustainability and Corporate Governance Committee is made up of a majority of independent directors: María Jesús de Jaén (Chair), Elena Jiménez de Andrade, Grupo Corporativo Fuertes, S.L. (represented by Tomás Fuertes) Luis Javier Cortés, and Adriana Hoyos Vega. The Audit Committee is composed of four independent directors: José Joaquín Güell (Chair), Juan María Aguirre, María Jesús de Jaén, and María Elena Monreal. The Appointments and Remuneration Committee is made up of a majority of independent directors and two proprietary directors: Augusto Delkader (Chair), Demetrio Carceller, José Manuel Loureda Mantiñan, Elena Jiménez de Andrade, and María Elena Monreal. Likewise, the Executive Committee is comprised of Manuel Manrique (Chair), José Manuel Loureda Mantiñan, Demetrio Carceller, Augusto Delkader and Luis Javier Cortés. Elm Row to York Place. Edinburgh 55

Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [2-9] The day-to-day management of Sacyr is delegated to the executive bodies and to the management team, which is supervised by the Board of Directors: a) at the corporate level, under the chief executive officer of Sacyr, S.A. with the assistance of the Management Committee; and, b) at each unit, by the chief executives of the various business units who, along with the managing directors, form the Management Committee. Manuel Manrique Cecilia is the Chairman and CEO, responsible for:

- The executive management of each business unit (P3, Engineering and Infrastructure and Water).

5.1.3 Management Committee

- The areas

that provide transversal support across the company: – Corporate Operations Department. – Finance Department. – People Operations Department. – Communications Department. – Strategy, Innovation and Sustainability Department. – Business Legal Advisory. – Secretary to the Board of Directors. At present, the percentage of women represented on the Management Committee is 22%. Manuel Manrique Cecilia Chairman and CEO Fernando Lozano Sáinz Chief Operating Officer Marta Gil de la Hoz Chief Strategy, Innovation and Sustainability Officer Carlos Mijangos Gorozarri Chief Financial Officer Pedro Alonso Ruiz Chief Communications Officer Patricia Martínez Íñigo Chief People Officer Alfonso Aguirre Díaz-Guardamino Head of Business Legal Affairs Ana María Sala Andrés General Secretary to the Board of Directors Aquilino Pravia Martín Internal Audit Director Sacyr Engineering and Infrastructure Pedro Sigüenza Hernando Chief Executive Officer Sacyr Concesiones Rafael Gómez del Río Sanz-Hernanz Chief Executive Officer Sacyr Water Eduardo Campos Pozuelo General Manager Chairman Executive Management Management Committee Management Team Integrated Sustainability Report - 2023 56 Graduate in Civil Engineering from Universidad Politécnica de Madrid. In 2005, he began his professional career at Sacyr, where he has held various positions of responsibility. He was appointed CEO of Sacyr Concesiones in 2015, after serving as Chief Operating Officer and General Manager of Sacyr Concesiones Chile in 2012, and as National Operations Manager in 2009. Previously, he held management positions at Itínere at the helm of Shadow Toll Roads and other P3 businesses. With 30 years of experience in the sector, he currently sits on the Boards of Directors of some twenty companies, across Spain and 11 other countries in Europe and Latin America. Graduate in Civil Engineering from Universidad Politécnica de Madrid. A professional with more than 25 years' experience in the construction of top-tier projects worldwide. He began his career at Andersen Consulting in the field of strategy consulting. In 2002, he joined Sacyr where he has held various senior management positions. In 2010, he was appointed to lead Sacyr's business in the Middle East and North Africa (Algeria, Libya, Qatar, Kuwait, Saudi Arabia and Türkiye). In 2018, he was appointed CEO of the Portugal-based business unit Sacyr Somague, overseeing the Group's businesses in the UK, Ireland, Portugal, Brazil and Africa. Since 2021, he has been General Manager and member of the Board of Directors of Sacyr Services, as well as a member of the Sacyr Group Management Committee. Civil Engineering graduate from Escuela Técnica de Ingenieros de Madrid, he held various leadership positions in the Build unit of Ferrovial over the first 10 years of his career. In 1987, along with three other engineers, he was part of the founding core of Sacyr. During his career in the company, he has held various positions of national and international responsibility in the Engineering and Infrastructure area. In 2003, coinciding with Sacyr's IPO, Manuel Manrique became the head of the holding company's construction unit. In November 2004, he was appointed Chief Executive Officer of the Sacyr Group and is a member of its Executive Committee. Since October 2011, he has served as Chairman. He is also the Chair of Sacyr Foundation, which focuses on social action, supporting innovation and promoting corporate volunteer work. Graduate in Mining Engineering from Universidad Politécnica de Madrid and École Nationale Supérieure des Mines de Nancy, and PDG from IESE Business School. In 2004, he joined the Sacyr Group assuming various leadership positions, including CEO of Valoriza Servicios Medioambientales (2004-2013) and CEO of Sacyr Industrial (2013-2018). Since 2018 he has been CEO of Sacyr Engineering and Infrastructure. Previously, he worked for Dragados and the Bouygues Group. Manuel Manrique Cecilia Sacyr Chairman and CEO Pedro Sigüenza Hernández CEO of Sacyr Engineering and Infrastructure Rafael Gómez del Río Sanz-Hernanz CEO of Sacyr Concesiones Eduardo Campos Pozuelo General Manager of Sacyr Water 57 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Graduate in Civil Engineering from Universidad

Politécnica de Madrid and MS in Management of Construction and Real Estate Companies from Escuela de Arquitectos de Madrid. With over 30 years of experience, he has been a part of the Sacyr Group since 1989. In his early years at the Group, he held various positions of responsibility in the Engineering and Infrastructure unit. In 2007, he was appointed CEO of Sacyr Services and in 2021 he took over as Corporate General Manager of the Sacyr Group. He previously worked in other construction companies and as an investment analyst at Sociedad de Centros Comerciales de España. Degree in Psychology from the Universidad Complutense de Madrid and PMD from ESADE Business School. She has been part of the Sacyr Group since 2003 and although her professional career has been mainly focused on the Human Resources area, where she held the position of Director of Sacyr Services until 2020, she has also developed transversally in other areas, having held the position of Director of Public Facilities at Sacyr Concesiones. A professional with more than 20 years of experience, she began her career in the Carrefour Group. Graduate in Telecommunications Engineering from the Universidad de Valladolid, PMD from IESE and Executive Program in Senior Management from ESADE. She began her career in the business consulting sector at companies such as Accenture. She joined Sacyr in 2004, and has since held various positions of responsibility in areas related to strategy, technology and innovation. In 2021, she was appointed Chief Strategy, Innovation and Sustainability Officer and became a member of the Sacyr Group Management Committee. Graduate in Information Sciences from Universidad de Navarra. He began his career at the business daily Expansión, where he served as head of the Business section. In 2003, he joined Sacyr as Director of Media Relations. From late 2008 to early 2012, he was Director of Communications at Administrador de Infraestructuras Ferroviarias (Adif). His current functions include the role of Executive Director of the Sacyr Foundation. Graduate in Civil Engineering from Universidad Politécnica de Madrid, and MBA from IESE Business School (Madrid). A professional with more than 30 years of experience in the sector, he has been with Sacyr since 2006. Serving as the Group's Chief Financial Officer since 2015, he previously held various positions at Sacyr Concesiones, including that of CEO. Fernando Lozano Sainz Chief Operating Officer Patricia Martínez Íñigo Chief People Officer Marta Gil de la Hoz Chief Strategy, Innovation and Sustainability Officer Pedro Alonso Ruiz Chief Communications Officer Carlos Mijangos Gorozarri Chief Financial Officer Integrated Sustainability Report - 2023 58 The Sustainability Committee is tasked with developing and executing the company's sustainability policies and actions. This Committee is chaired by Manuel Manrique, Chairman and CEO of the Group, and comprises representatives from the Corporate Operations, People Operations, Strategy, Innovation and Sustainability, Communications, Finance and Business Legal Advisory departments, and the Secretary to the Board of Directors. 5.1.4 Sustainability Committee [2-13] [2-14] [2-15] In exercise of our legal corporate autonomy, at Sacyr we have developed a Corporate Governance System which is continuously updated and is projected on the Company and its Group. The result is systematic regulatory assurance of the best fulfillment of the social contract, the corporate purpose and interests, rigorously complying not only with 93.33% of the applicable legal corporate governance obligations, but also following all good governance practices and recommendations, both national (CNMV) and international. The Corporate Governance System is made up of: i) the Articles of Association, ii) the Purpose, Mission, Values, Vision and Principles, iii) the Code of Ethics and Conduct, iv) the Regulations of the Annual General Meeting and of the Board of Directors, v) the Corporate Policies and, vi) Sacyr and its group of companies Internal Code of Conduct in the securities markets. All of these documents are available on the Group's website. The Code of Ethics and Conduct, Articles of Association, Board Regulations, internal policies and regulatory texts were updated and enhanced in 2023 as part of our Corporate Governance System improvement: 5.1.5 Corporate Governance System a. Update of Code of Ethics and Conduct, in light of the new requirements emanating

from Law 2/2023, of February 20, on the protection of whistleblowers and combating corruption. b. Amendment of the Articles of Association with the aim of: (i) reducing the maximum number of members of the Board of Directors from 19 to 15 to better comply with Recommendation No. 13 of the Code of Good Corporate Governance, (ii) strengthening the functions of the Lead Director and limiting an individual's term in this post to four years to promote greater independence in the execution of this function, (iii) limiting the casting vote of the Chairman of the Board of Directors and, (iv) strengthening the grounds for compulsory removal of executive directors. c. Amendment of the Board Regulations resulting from the aforementioned amendments to the Articles of Association, specifically those relating to the reinforcement of the functions of the Lead Independent Director, the limitation of the casting vote of the Chairman of the Board of Directors and strengthening the grounds for compulsory removal of executive directors. d. Approval of the new General Policy for the Internal Information System and the Cybersecurity Policy, as well as the updating of the following policies: 1. Remuneration Policy for the Directors of Sacyr for 2023, 2024 and 2025. 2. Policy for the Selection, Appointment and Reelection of Directors. 3. Financial, Non-Financial and Corporate, and Shareholder, Institutional Investor, and Sacyr Proxy Adviser Communications Policy. 4. Sustainability Policy Framework. 5. Supply Chain Management Policy. 6. Biodiversity Policy. 7. Human Rights Policy. 8. Corporate Tax Policy. 9. Personal Data Protection Policy. 59 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 10. Policy regarding Anti-Corruption and Relations with Public officials and authorities. 11. Policy regarding Accepting and Offering Gifts and Corporate Courtesies. 12. Policy regarding Donations and Sponsorships. 13. Policy regarding Regulatory Compliance for Antitrust and Fair Competition. 14. Policy Regarding Regulatory Compliance for Criminal Prevention. 15. Quality, Environment and Energy Management Policy. 16. Circular Economy Policy. 17. Occupational Health and Safety Policy. Our remuneration system is aimed at attracting, retaining and engaging the top-performing professionals, as well as to establish a stable and long-lasting employer-employee relationship between remuneration, results and shareholders' interests, contributing to the business strategy and to the company's long-term interests and sustainability, and introducing the necessary safeguards to avoid undue risk-taking and the rewarding of poor results. Furthermore, this system takes into account the economic environment, Sacyr's results and the Group's strategy, the legal requirements applicable to capital companies, best market practices and, to a large extent, the Good Governance Recommendations. The individual breakdown of the amounts received by the directors in their capacity as such in 2023 are shown in the Annual Remuneration Report, available on our website www.sacyr.com and on the CNMV website. 5.1.6 Remuneration and incentives Directors' remuneration [2-19] [2-20] The Annual General Meeting on June 15, 2023 approved an amendment of the Directors' Remuneration Policy applicable to 2023, 2024 and 2025. Application of the principles set forth in the Policy in connection with remuneration to directors in their capacity as such means that the Policy has the following characteristics: • It is aligned with Corporate Governance standards and market circumstances, based on Sacyr's characteristics and activity. – When establishing the structure and levels of directors' remuneration, the Company analyzes the market practices concerning remuneration at other listed companies and is advised by specialized consultancy firms. • Remuneration is an incentive and rewards dedication, skill and responsibility, depending on the positions and responsibilities of each director on the Board of Directors and its Committees. • The directors, in their capacity as such, do not have a variable remuneration system, in accordance with the Good Governance Recommendations and Sacyr's Remuneration Policy. Variable remuneration is now reserved for the executive director in the terms provided in his contract with the

Company, comprising short- and long-term variable remuneration and complementary variable remuneration. – Short-term variable remuneration. Each and every one of the objectives for 2023, including those linked to ESG goals, were established in accordance with the Company’s Strategic Plan. The goals have indicators, metrics and weightings approved by the Board of Directors. Each metric is associated with a scale of achievement defined as a function of its variability and difficulty. These scales have a minimum compliance threshold (70%) below which no right to an incentive is generated, and a maximum of 130%. Accordingly, to ensure optimal balance, the goals are classified into the following sections i. Company performance and contribution of value to shareholders; ii. Strategy; iii. People, diversity and sustainability. Integrated Sustainability Report - 2023 60 Type Weight Description of goal in 2023 Weighting Company performance and contribution of value to shareholders 80% EBITDA Sacyr 20.00% Sacyr after-tax earnings (adjusted) 30.00% Operating cash generation 10.00% Share value: the best of the following indicators: a) % Sacyr share increase or b) Sacyr share value increase vs. IBEX in 2022 (as a %). 15.00% Improvement in shareholder remuneration 5.00% Strategy 10% Reduction of recourse corporate debt 5.00% Execution of the divestment process 5.00% People, diversity and sustainability 10% Improving the diversity ratios (gender, social, functional and cultural) 2.50% Management Committee Succession Plan 2.50% Reduction of CO2 emissions 2.50% Reduce the accident rate 2.50% 100% 100.00% – Long-term variable remuneration. This consists of a six-year Plan divided into five overlapping independent cycles, the first lasting two years and the rest three years. The Plan is a non-vested variable remuneration scheme for the Eligible Management Team, as well as executive directors, dependent on compliance with the EBITDA and after-tax earnings goals established in the 2021- 2025 Strategic Plan, TSR (Total Shareholder Return) and the beneficiary’s individual performance. – Complementary variable remuneration. This consists of a Plan linked to the Company’s share performance (appreciation) and grants its beneficiaries a percentage of the increase in the Company’s market capitalization which could, inasmuch as said increase exceeds at least 75%, result in a complementary variable remuneration payable in shares. The Plan covers the same period as the 2021-2025 Strategic Plan and will be settled in 2026, 2027 and 2028 (50%, 30% and 20%, respectively), in accordance with the increase in the Company’s market capitalization, the average individual performance and dependent upon compliance with the sustainability goals established in the framework of the Company’s Strategic Plan. In relation to the overall remuneration of the Board of Directors, pursuant to the Articles of Association, Sacyr’s directors, in their capacity as members of the Board, are entitled to receive remuneration from the Company consisting of a fixed annual sum. The total remuneration accrued in the financial year 2023 to all members of the Board of Directors (in thousands of euros) was 8,434 (8,364 in 2022) and includes: (i) The gross amounts received by the directors in their capacity as members of the Board of Directors, and (ii) Total remuneration to the executive director (fixed, short-term variable, life insurance, health insurance and LTI scheme). With regard to the members of the Board in their capacity as such, at year-end there were no pension or life insurance payment obligations, or share-based payments. Every year we publish our Annual Report on Good Governance to provide comprehensive information on our corporate governance structures and practices, detailing our decision-making processes, management of possible conflicts of interest and the criteria used to appoint and select members of the most senior body, among others (details in section C of the aforementioned document). 61 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Why do we innovate at Sacyr? At Sacyr, innovation is the driver of change and the tool that enables us to adapt to all the challenges in a constantly changing world. Our purpose is to increase efficiency, make the right decisions,

stand out in the market and identify new business models. We are transforming because we believe in making the world a more sustainable and fairer place. Sustainability is one of the main pillars of our model. We endeavor to drive innovative projects aimed at reducing carbon emissions and energy consumption in our operations and optimizing the management of resources linked to the water footprint. Our purpose is to drive society forward by developing and managing infrastructure that generates a positive social, economic and environmental impact for all stakeholders. We have centralized the management of our Intangible Industrial and Intellectual Property Assets, Domain Names and Industry Secrets. The Industrial and Intellectual Property Office is the body in charge of overseeing and controlling procedures linked to the intangible assets generated by the various companies that make up our group. Our innovation strategy Innovation has always been paramount for us and is a cornerstone of our 2021-2025 Strategic Plan and our commitment to sustainability. At present, 66% of our innovation projects are sustainability-focused. Sacyr remains committed to innovation to continue generating competitive advantages that ensure our company's short-, medium- and long-term competitiveness by means of sustainable growth. Our innovation strategy is based on various core pillars: • Commitment of senior management in achieving the innovation objectives. • Exploration and anticipation of the challenges, opportunities, assessment of long-term scenarios and areas of opportunity. • Development and scaling of initiatives with an impact on the business. • Gradual increase in the level of disruptive innovation. • Implementation of agile and effective mechanisms to foster innovation throughout the organization. • Attracting the top innovative talent and constantly developing our employees, fostering their capacity to innovate regularly. • Establishment of a global R&D+i management system to standardize processes and maximize the impact of innovation.

5.2 Innovation Faculty of Health Sciences, Universidad de Granada. Spain Integrated Sustainability Report - 2023

62 Open innovation iChallenges We are committed to an open innovation model in which we work with external innovators who contribute differential solutions to our business challenges and build a sustainable future for Sacyr. The program is open to large companies, research centers, universities, startups, etc. from anywhere in the world, who present their technological solutions, methodologies and new business models. In this sixth edition, 3 business challenges were launched in Roads, Construction and Water, and 205 submissions were received from 34 countries. Of the nine (9) finalists this edition, three (3) proposals were distinguished in the Sacyr Foundation's Innovation Awards for their high impact and feasibility of implementation: • Valerann, a British-Israeli smart traffic management platform. • Kraken Sense, a technology developed in Canada for the early detection of pathogens and contaminants at very low concentrations in water treatment plants. • And Latvian company SPH Engineering's use of drones with integrated sensors for bathymetric surveys in remote areas.

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Multi-corporate open innovation programs In 2023, we took part in various initiatives run by benchmark institutions to promote the creation of synergies and boost collaboration between innovative corporations and companies at the local and international level. Notable among these initiatives are: • The European Commission's UELAC Digital Accelerator to drive digital and technological transformation among regions of Europe, Latin America and the Caribbean. • European Innovation Council (EIC) Multicorporate Day on ConTech, focusing on sustainable building. • Madrid City Council's Advanced Technologies Challenge program, focusing on Artificial intelligence. • The Advanced Factories program run by Acció, Catalonia's public agency for business competitiveness, in the framework of the Smart Factories event, held in Barcelona. Innovision This new initiative enables us to identify business opportunities around emerging technologies, alongside experts, technologists and

leading companies in the field. Through various meetings, we explore technologies of interest to Sacyr's businesses and we examine the advantages of their application to our activities. The first technology explored was satellite tech, given the rapidly evolving space industry and the appearance of new geospatial services and applications of interest. This is a global initiative, allowing us to identify highly innovative employees in each country and business in which Sacyr operates. This year we held the 8th edition of the awards, which featured 114 candidates from 9 countries, and 45 winners. InnoDay In 2023 we launched an initiative aimed at strengthening the innovation community, creating a learning space to improve the development of innovation initiatives, expand the culture of innovation and sustainability in a transversal way and inspire participants from different business units to work together in pursuit of the Group's objectives. On the first Innoday the chosen topic was sustainable innovation at Sacyr. At the event, the foremost representatives of innovation at Sacyr met and a number of dynamics were implemented to develop the "Manifesto for Sustainable Innovation" and propose initiatives to foster a culture of sustainable innovation at the company. Sacyr iFridays Inspirational sessions in which companies from different sectors share how they apply innovation and sustainability to their activities. +6,000 Views in 2023 10 Sessions held 600 Views on average per iFriday session in 2023 Innovation culture Natural Innovators The Natural Innovators Awards are a symbol of our commitment to innovation and an annual recognition of our most important values: Innovation, Talent, Teamwork and Sustainability, making Sacyr increasingly competitive, sustainable and innovative. Integrated Sustainability Report - 2023 64 Bateria This project is aimed at responding to the challenges posed by recycling lithium-ion batteries and coming up with solutions to the problems linked to the recovery and selective separation of critical materials such as lithium, cobalt, nickel and manganese. New recycling technologies are developed to sustainably recover the largest possible proportion of metals. In addition, a number of processes are being automated (characterization, sorting, disassembly, etc.) to improve operating efficiency and safety, to be tested at the pilot facility. The initiative is led by Sacyr Concesiones and involves Sacyr Proyecta and other public and private sector organizations covering the process's entire value chain. Our most innovative projects at the service of sustainability Digital materials passport The purpose of this project, led by Sacyr E&I, in collaboration with companies in the Construction sector, is to establish a methodology to trace construction materials. The use of Blockchain technology allows us to certify the origin of materials and processes (extraction, manufacturing, transportation, build and end of useful life), generating a digital passport. To scale this project, indicators were aligned with common EU indicators aimed at measuring the sustainable performance of buildings over the course of their entire life cycles. The Predictive Company AI for energy-smart buildings In collaboration with the startup The Predictive Company, we are developing this initiative to optimize infrastructure energy consumption, maintaining thermal comfort and fulfilling the rest of indicators associated with the service. The solution uses algorithms fueled by artificial intelligence that combine internal variables, such as consumption and occupancy, with external metrics, like temperature, humidity, wind speed and atmospheric pressure. This allows us to anticipate a building's energy requirements and tailor the production and operation of climate control equipment to achieve an optimized result. This project was rolled out at the Moncloa Transport Hub in Madrid. HyReward This Sacyr Water initiative allows us to test and scale a technology to generate renewable electricity from brine produced in the desalination process. The new process consists of combining reverse osmosis and reverse electrodialysis. Integrating this process into conventional technology allows us to boost energy efficiency, by recovering electricity contained in the resulting brine and, accordingly, the CO2 emissions. Automatic cone machine safe signaling system ACM3S This Sacyr Maintenance project consists of designing an autonomous system for handling traffic cones in highways to close off lanes

without the need for human intervention on the ground. The aim is to develop equipment using industrial robotics and accurate positioning for the proper road surface signaling and the automatic placement/removal of cones, guaranteeing complete safety throughout the operation. This project transforms safety standards on our roads and helps avoid the presence of vulnerable users.

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Innovation in figures 41 Projects in development 12 projects launched in 2023 8 Group companies certified to UNE 1660002:2021 standard €12.8 M Investment in Innovation €4.7 M Sustainability-related investment 16,842 Innovation training hours 34 Innovation employees 367 Employees involved in innovation initiatives 8.4% of net profit invested in Innovation €6 M Revenue by new business models

Ruta de la fruta. Chile Integrated Sustainability Report - 2023 66 Good governance in risk management is a strategic lever to boost our resilience, strength and responsibility as a business. We prioritize risks and opportunities considering the financial and non-financial implications for all our stakeholders. [2-12] [3-3]

At Sacyr we have an Integrated Risk Management System (IRMS) aimed at facilitating key business decision-making, as part of a company risk culture, through a systemic and structured analysis of all the risks inherent to our business activity. The IRMS is implemented and consolidated in all our operations and underpins the Group's risk culture and Risk Control and Management Policy (hereinafter, the "Policy"), approved by the Board of Directors, which sets out the basic principles and general framework that should guide Sacyr's actions in respect of the supervision, control and management of all kinds of risks inherent to our activity. The goal of this policy is to obtain a reasonable degree of certainty with regard to the achievement of the company's strategic goals, considering the efficiency of our operations and the commitment to our different stakeholders, and taking into account the purpose, values and corporate strategy. The Policy establishes the acceptable risk and the overall tolerance level by type of risk and is developed and complemented through specific internal procedures and rules for the control and management of the different risks, established by the Group's corporate functions or businesses, and maintaining the company's three levels of defense (operational management, risk management functions and supervision of compliance and internal audit). The Risk Analysis Procedure provide the scope, values, principles, governance model and operating bases of the Group's Integrated Risk Management System (IRMS) in each business unit, and its objectives are as follows:

- To reinforce Sacyr's risk culture, based on the principle of transparency, responsibility, involvement ("risk ownership") and business orientation to ensure informed, responsible and expedient decision-making at all levels.
- To promote continuous improvement in the key business decision-making processes.
- To describe and structure the risk analysis process in various stages: risk planning, identification, assessment, treatment, monitoring and control, as well as the activities to be performed in each stage.
- To define the distribution of roles and responsibilities during the risk control and management process to guarantee that decision-making is scaled to the appropriate level in keeping with the type of decision and the risk implications.
- To support the integrated framework of international reporting and international standards in internal risk control and management to provide transparent and balanced information to all our stakeholders.
- To continue to be a global leader in good governance when it comes to risk management, by means of our groundbreaking risk management model.

5.3.1 Integrated Risk Management System (IRMS) 5.3 Risk management

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- Effective integration of risk management in the day-to-day business.
- Project backlog aligned with the strategic goals and expectations of stakeholders.
- Timely warning and involvement of

the right people. • Key business decisions based on the analysis of risks and opportunities. GOOD GOVERNANCE RISK MANAGEMENT SCALABLE RISK ALERT PROJECT MANAGEMENT EARLY WARNING SYSTEMS IN PROJECT MANAGEMENT STRATEGIC PLAN STAKEHOLDERS SACYR GROUP'S RISK CONTROL AND MANAGEMENT POLICY MARKET Key business decision-making model. Key business decision-making model. Risk management governance model The IRMS works as an early-warning system underpinning the key business decision-making processes, with the aim of aligning the project backlog with the Group's strategic goals and the expectations of our stakeholders. Sacyr has designed its own software (MyRISK) to support the IRMS throughout the project life cycle, allowing us to involve and warn the right people in a timely manner considering the financial and non-financial implications of the risks. Rumichaca-Pasto. Colombia Integrated Sustainability Report - 2023 68 RISK COMMITTEE Management • Most senior body in charge of good governance and risk management strategy. • Responsible for nurturing the corporate risk culture. BUSINESS LINES Management • Responsible for managing the risks inherent to the Group's activity. Risk control and management process Risk prioritization is structured over six stages: 1 3 5 2 4 6 Identification: activities are carried out to anticipate opportunities and critical risks of various kinds associated with each key decision, considering their possible effects on both the achievement of the Group's strategic goals and its stakeholders. Treatment: the purpose of the activities carried out during this stage is to define the response strategy for each specific risk (accept, avoid, mitigate or transfer), and to implement the adequate response or action plans (Mitigation and/or Contingency Plans), in line with the exposure and tolerance established in this regard. Control: this stage includes internal control and assurance activities carried out by the Risk Management and Control Department, and the uptake of lessons learned for the continuous improvement of the IRMS, the Risk Control and Management Policy and other internal rules and regulations. Planning: taking the company's strategy and objectives as a reference, at this stage the required management tools are activated and the parties responsible and risk owners involved in taking key business decisions are designated. Assessment: performance of activities enabling the critical risks previously identified to be assessed, filtered and prioritized, in accordance with scales of impact, tolerance thresholds and other common support metrics defined to establish the materiality of these risks. Monitoring: this stage gauges the performance of pre-existing risks and new risks, assessing the effectiveness of the response plans, recalibrating tolerance and risk assessment scales and activating contingency plans if maximum tolerance thresholds are exceeded. Governing bodies BOARD OF DIRECTORS/AUDIT COMMITTEE Definition, approval and supervision • Risk control and management strategy. • Risk Control and management policy. INTERNAL AUDIT DEPARTMENT Support to supervision • Systematic assessment of efficiency in risk identification, control and management processes. • Annual internal Audit Plan. 69 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices RISK CONTROL AND MANAGEMENT DEPARTMENT Support to management • Responsible for monitoring and reporting on risk control and management to facilitate key business decision-making processes. • Responsible for devising and maintaining the IRMS. • Facilitator of the key business decision-making processes. BUSINESS SPECIALIZATION AREAS Support to management • Responsible for the control and management of the various risks inherent to the Group's activity (human resources, legal, sustainability, cybersecurity, regulatory compliance, operations, etc.). EXTERNAL SPECIALISTS Support to management • Independent third parties specializing in the various risks inherent to the Group's activity. Main risk factors Sacyr has a considerable international presence and carries out its activity across a range of sectors, social and economic environments, and regulatory frameworks. Against this backdrop it is exposed to different kinds

of risks, inherent to the businesses and sectors in which it operates. As part of its Integrated Risk Management System (IRMS), Sacyr has compiled a Risk Catalog, which is updated periodically and enables standardized and consolidated reporting at the project, business and Group levels. The Catalog structures the types of risk and classifies them into four categories: strategic, financial and reporting, operational, and regulatory compliance (the latter including tax risk and risks derived from corruption, among others). Strategic: risks related to the objectives of each of the businesses, as well as those related to the market and the environment in which the Group and the businesses operate. Financial and reporting: exposure to credit, liquidity and market risk, especially in connection with fluctuations in interest and exchange rates, and risks associated with changes or inconsistencies in financial reporting, as well as the proper design and operation of financial reporting systems. Operational: risks associated with Group and business processes and operations. Regulatory compliance: risks related to compliance or lack of supervision and oversight of applicable legislation and/or regulations in each jurisdiction, of commitments to third parties (tax, legal, environmental, social and corporate governance), and of self-imposed obligations arising from the Code of Conduct. The risk catalog includes specific risks related to environmental aspects, good governance, corporate responsibility, etc. (so-called “ESG” risks) to facilitate early detection and control of material topics, as well as the assessment of impacts established by the double materiality approach and monitoring and mitigation of action plans.

INTEGRATED RISK MANAGEMENT SYSTEM (IRMS) Integrated Sustainability Report - 2023 70 Main risks with short and long term impact SHORT TERM Strategic Financial and reporting Operational Regulatory compliance* The prioritization of the critical risks identified is based on their level of criticality, obtained from the combination of the impact assessments and the probability that the risks will occur. Consequently, risk assessment takes into account both the financial impact (cash generation, cash, earnings, appropriation of funds, etc.) and the non-financial aspects (deadlines, quality, stakeholder relations, health and safety, legal, environmental, social and/or corporate governance or reputational aspects, etc.) analyzing the potential implications of risks for the business itself and for our stakeholders.

LONG TERM Unforeseen contingencies that reduce the net margin, especially in projects worth very large amounts. Currency exchange risk. Liquidity shortage (as a result of financing difficulties, customer insolvencies, cash tensions, etc.). Non-compliance and/or delay by the customer in recognizing their contractual obligations due to red tape delays or excessive bureaucratic burden. Macroeconomic situation in the company’s benchmark or home markets. Shortage of talent matching specific profiles. Supply chain disruption due to raw material shortages and/or price increases. Non-compliance with the goals set out in the business divestments. Cybersecurity. ESG and supply chain related reputational risks for the company. High sensitivity of offers to economic parameters (inflation, interest rates, exchange rates). International geopolitical tension: large-scale increase in armed conflicts with the involvement of additional countries. Liquidity shortage (as a result of financing difficulties, customer insolvencies, cash tensions, etc.). Difficulties in accessing financing sources. Changes in markets that imply a loss of market share or reduction of margins (entry of new competitors, foreign companies lobbying, competition strategies, appearance of new technologies, etc.) Customer rigidity with respect to claims and/or modifications to the contract over the latter’s duration. Macroeconomic situation in the company’s benchmark or home markets. Currency exchange risk. Cybersecurity. ESG and supply chain related reputational risks for the company.

1 5 7 9 3 10 2 4 6 8 *

* In 2023 there is no risk in this category.

Risk category 71 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Risk control and management activities carried out in 2023 Especially notable this year was the specific risk management training at all organizational levels using

mini-tutorials, and the effective integration of specific metrics for risk management, sustainability and talent management in the variable remuneration program to strengthen the company's risk culture and underpin the goals set out in the 2025 Sacyr Sustainable Action Plan. Furthermore, the high-level risk maps have been updated, assessing the risks of new regulations and emerging risks that may have a long-term material impact on the business. The mechanisms for the supervision of Internal Control over Financial Reporting by the Audit Committee have also been reviewed. Américo Vesputio toll road. Chile

In 2023, we have continued to focus our efforts on boosting the efficacy of the IRMS across all business areas, as an early-warning system, and on updating the existing risk maps. The due diligence process established in the Third Party Risk Analysis Regulations has been reinforced in the areas of compliance, anti-corruption, antitrust and fair competition. The review and update of the IRMS is ongoing, in order to integrate the new requirements applicable to the Group's sustainability, as established in the 2025 Sacyr Sustainable Action Plan, the new requirements of EU Directives (CSRD, Due Diligence, etc.) and the market recommendations/best practices. Integrated Sustainability Report - 2023 72 > Main stakeholders

UNSTABLE GEOPOLITICAL SITUATION Sacyr conducts its activity on the international stage and in different sectors, social and economic environments, and regulatory frameworks. The Group is exposed to a broad variety of legal frameworks. The increase in protectionism, armed conflicts, bilateral tensions between countries, weakened public-private collaboration and institutional instability, coupled with the general economic contraction, could lead to regulatory and institutional changes that adversely impact the granting of required permits and authorizations, the management and development plans of the assets currently underway, as well as on new project tenders. Related risks

- Non-fulfillment of business plans, arising from the reduced tendering processes, delays in obtaining permits or licenses, and so on.
- Instability in emerging markets.
- Weakening of public-private collaboration.
- Regulatory uncertainty impacting on geographical positioning.

Action plans

- Continuous monitoring of changes in the regulatory, legislative, political and macroeconomic environments at home and abroad.
- Country risk analysis taking into account economic and non-economic aspects (tax, social, environmental, etc.).
- Reinforcement of coordination and engagement of local teams in key business decision-making.
- Implementation in all business areas of the MyRISK tool, integrated into the project management operations in both the bidding and execution phases, to underpin the Project Risk Control and Management Policy at every stage, from discovering of the business opportunity to project closure.

Opportunities

- New investment opportunities.
- Boosting infrastructure as a strategic sector.
- Support for companies as drivers of development.

Corporate policies and procedures

- Policy regarding Anti-corruption and Relations with Public Officials and Authorities.
- Policy regarding Regulatory Compliance for Criminal Prevention.
- Corporate Tax Policy.
- Supply Chain Management Policy.
- Human Rights Policy.
- Risk Control and Management Policy.

Employees Customers Suppliers Community Nature Shareholders S G Ruta 78. Chile 5.3.2 Sacyr's main risks 73 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

RAW MATERIAL SHORTAGES OR HIGHER PRICES Inadequate management of raw material prices with suppliers or shortage of key raw materials for the development of Sacyr's activities. Related risks

- Overshooting project execution costs.
- Claims not recognized by customers (deadlines, overshooting costs, fines for delays, etc.).
- Loss of business opportunities.
- Supply chain disruption and instability.

Action plans

- Identification of raw materials, suppliers and critical contracts.
- Negotiations with customers to establish price review and compensation formulas.
- Inclusion in new contracts of risk-sharing clauses in the event of supply chain disruption and instability.
- Negotiation of long-term contracts with suppliers.
- Review of current contracts and implementation of a new risk-sharing policy in the event

of supply chain disruption. • Active supplier management. Opportunities • Appearance of new price review formulas. • Diversification of the supplier and subcontractor portfolio. • Fostering of the circular economy and reduction of dependence on monopolies by tapping into emerging markets. • Support for innovation with the emergence of alternative, more sustainable raw materials that reduce the amounts of raw materials and critical materials used. Corporate policies and procedures • Supply Chain Management Policy. • Human Rights Policy. Related risks • Shortage of liquidity and credit implying imbalances in the financial structure. • Non-compliance with financial obligations. • Excessive current debt that affects payment commitments. • Erosion of net margins. Action plans • To mitigate liquidity risk and counterparty risk: - Identification of probable scenarios through the monitoring and control of the annual budget and the daily updating of cash forecasts. - Negotiation of financial waivers with multiple creditors. - Increase and diversification of available sources of financing and arrangement of new liquidity lines. - Corporate third-party risk analysis procedure. - Management of a diversified customer portfolio to avoid excessive concentration. • To mitigate interest rate and exchange rate risk: - Use of financial derivatives, as well as the arrangement of debt at fixed-rate interest in operations where this is feasible. - Seeking projects that secure and finance their investments with the cash flow they generate (Project Finance). - The vast majority of P3 agreements are linked/indexed to inflation. • Procedure for the approval of financial requirements of projects in the bidding phase integrated into the MyRISK tool, underpinning the Project Risk Control and Management Policy and policies of the Finance Department. Opportunities • Improvement in financial profit/loss. • Improvement in the income statement. • Diversification of financing sources. • Value creation in refinancing. Corporate policies and procedures • Risk Control and Management Policy. • Procedure for approval of financial requirements in project management. FINANCIAL RISKS Credit, liquidity and market risks, especially interest rate and exchange rate fluctuations. The Group's aim is to ensure business stability and financial strength in a sustainable manner over time. G S G Integrated Sustainability Report - 2023 74 Related risks • Image and brand deterioration. • Negative impact on stock performance and results of the Group. • Leaking and improper use of insider information. • Fewer project awards. • Insufficient or inadequate development of critical infrastructure to meet the needs of all stakeholders. Action plans • Strengthening of financial reporting through the appropriate channels, maximizing the dissemination and quality of the information (CNMV, corporate website, AGM, among others). • Application of the rules concerning the treatment of insider information set forth in the Regulations of the Board of Directors, Internal Rules of Conduct and the Code of Ethics and Conduct. • Transparency, truthfulness, immediacy, equity and symmetry in the dissemination of information. The Group has a dedicated Investor Relations Department, which reports to the Finance Department, tasked with serving as an open, permanent and transparent channel of communication with investors, shareholders and other stakeholders. • Use of the Spanish National Securities Market Commission (CNMV) as the primary information channel. • Protection of the rights and legitimate interests of all shareholders. • Immediate information distribution lists to investors, analysts and shareholders. Opportunities • Improvement in the satisfaction of all stakeholders. • Positive effect on the share performance and results of the Group. • Improvement in project awards. • Reputational improvement. Corporate policies and procedures • Financial, Non-Financial and Corporate, and Shareholder, Institutional Investor, and Sacyr Proxy Adviser Communications Policy. FAILURE TO MEET STAKEHOLDER EXPECTATIONS Risks associated with the defense of stakeholder interests (shareholders, investors, regulators, supervisors, employees, partners, contractors and suppliers, creditors, customers, media, public opinion, etc.). SYSTEM FOR INTERNAL CONTROL OVER FINANCIAL REPORTING (ICFR) Risks relating to the System for Internal Control over Financial Reporting (ICFR) established by the Sacyr Group.

This system defines a governance and role distribution model involving all organizational levels. Related risks • Cost increase associated with new reporting requirements and internal control mechanisms. • Not identifying possible liabilities correctly. • Reputational damage associated with lack of reliability in financial reporting. Action plans • Implementation of a control certification tool that is periodically applied in the areas involved in generating and reviewing financial information, in order to evaluate the effectiveness of the controls in place in these areas. • Approval of the ICFR Supervision Plan with the objective of maintaining reasonable assurance that risks due to errors, omissions or fraud in financial information are being prevented and detected (systematic control, monitoring and incident prevention measures). • Analysis and review of the reports prepared by the head of ICFR of the Sacyr Group on the status of ICFR in the various business areas. • Internal and external audit plan. • Internal and external audit of internal control certifications. • Establishment of remediation plans and systematic control, monitoring and incident prevention actions. Opportunities • Greater reliability and integrity of financial information. • Improvement in key business decision-making. • Operating process efficiency. Corporate policies and procedures • Risk Control and Management Policy. • Handbook for Compliance with the Sacyr Group's System for Internal Control over Financial Reporting (ICFR). G E S G 75 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

INADEQUATE CHOICE OF PARTNERS AT THE BIDDING STAGE Sacyr takes part in highly competitive and complex bidding processes, which take a long time to award. Submitting bids requires an adequate investigation of prices, deadlines, availability of supplies, contractual conditions, as well as a proper choice of consortium partners, considering both technical and financial capacity, as well as ethical concerns. Sacyr is therefore exposed to the risk of choosing unsuitable partners, which may have repercussions on the established profitability and quality objectives and deadlines, and could deteriorate its image or reputation. LACK OF INTEGRITY Effects that could lead to an absence or inadequate application of internal and external standards of behavior and conduct of the Governing Bodies, Senior Management and all Sacyr employees, as well as important third parties for the Sacyr Group, with a view to transmitting confidence to stakeholders and ensuring the maximization of Sacyr's value. Related risks • Reputational damage, financial and operational losses due to non-compliance with ethical requirements. • Criminal liability of legal person and natural person. Action plans • Support for management through the Regulatory Compliance Unit, responsible for ensuring the adequate implementation of Regulatory Compliance, Criminal Prevention and Competition Defense Models. • Risk assessment and controls in connection with integrity, criminal and competition risk by business unit. • Training and communication plan in connection with compliance. • Management of communications received through the whistleblower channel and investigation of complaints received. • Designation of a Data Protection Officer and stringent compliance with the Data Protection Act and guarantee of digital rights. • Customer and partner approval procedures in the bidding phase integrated into the MyRISK tool, to support the policies and procedures approved by the Group's Compliance Unit. Opportunities • Improvement of internal and external trust. • Improvement in our position in ESG indexes. • Talent attraction. Corporate policies and procedures • Code of Ethics and Conduct. • Policy regarding Regulatory Compliance for Criminal Prevention. • Policy regarding Anti-corruption and Relations with Public Officials and Authorities. • Policy regarding Regulatory Compliance for Antitrust and Fair Competition. • Policy regarding the Internal Information System. Related risks • Deterioration of image and/or reputation. • Erosion of margins or profitability. • Contractual breaches with the resulting imposition of fines. • Penalties. Action plans • Reinforcement of the due diligence policy applicable to important third parties to the Group in all business areas in connection with compliance,

anti-corruption, antitrust and fair competition. • Continuous review of the business opportunity approval procedure whereby the most relevant risks pertaining to each bid are assessed and weighted, with a particular emphasis on price analysis and the choice of partners and suppliers. • Existence of an Investment Committee. • Integration of the bidding and business opportunity selection platform with the MyR!SK tool to support the due diligence procedure established by the Group. • New internal controls for approval of new partners and customers. Opportunities • Reinforcement of internal control process of important third parties for the Group. • Reinforcement of the value chain due diligence policy. Corporate policies and procedures • Code of Ethics and Conduct. • Policy regarding Regulatory Compliance for Criminal Prevention. • Policy regarding Anti-corruption and Relations with Public Officials and Authorities. • Policy regarding Regulatory Compliance for Antitrust and Fair Competition. • Policy regarding the Internal Information System. G G Integrated Sustainability Report - 2023 76 Related risks • Affect on the welfare or physical well-being of employees and third parties. • Disruptions to operations. • Civil/criminal liability for damages. • Deterioration of image and/or reputation. • Affect on third parties and stakeholders. Action plans • Strict compliance with the applicable legislation and legal regulations in force, as well as the development of a suitable Occupational Health and Safety Management System. • Existence, application and continuous updating of the Occupational Health and Safety Policy. • Continuous training plan through the corporate training platform (Explora). • External and internal audits with a particular focus on critical activities and risks of the health and safety management systems. • Civil and professional liability insurance coverage. • Implementation of the MyR!SK tool across all business units, integrated into bidding and project management operations, to underpin the Project Risk Control and Management Policy. • Fostering of activities to promote employees physical and mental health. Opportunities • Improvement of employee satisfaction. • Improvement in our position in ESG indexes. • Increased productivity. Corporate policies and procedures • Occupational Health and Safety Policy. • Road Safety Policy. • Procurement and Contracting Management Procedure. • Procedure to identify hazards, risk and opportunities assessment. For more information, see chapter 7.3 Safety, health and wellbeing of this report. Related risks • Non-fulfillment of agreed quality standards. • Failure to meet delivery deadlines or expected profitability. • Contractual disputes. • Deterioration of image and reputation. Action plans • Integrated Quality Management System (ISO 9001, UNE 17025, etc.). • Half-yearly report to the Board of Directors and Audit Committee on the Group's main legal risks. • Indicators of quality standards project implementation and service delivery. • Adequate implementation of a management team to identify possible incidents in connection with contractual obligations. • Annual internal and external audit plan. • Analysis and monitoring of project strategies and claims. • Analysis and monitoring of existing and potential contingencies. • Project monitoring through internal management control programs. • Implementation of the MyR!SK tool across all business units, integrated into bidding and project management operations, to underpin the Project Risk Control and Management Policy. Opportunities • Reinforcement of internal control mechanisms. • Reinforcement of the Group's integrated project management approach taking into account economic and non-economic aspects throughout the value chain. Corporate policies and procedures • Code of Ethics and Conduct. • Policy regarding Regulatory Compliance for Criminal Prevention. • Policy regarding Anti-corruption and Relations with Public Officials and Authorities. • Policy regarding Regulatory Compliance for Antitrust and Fair Competition. • Policy regarding the Internal Information System. INADEQUATE QUALITY OF SERVICE AND/OR CONTRACT MANAGEMENT Sacyr's strategy is focused on contributing added value and the quality of its activity in all business units. Therefore, unwillingness of customers to accept claims arising from unforeseen events during project execution may have repercussions on the established profitability

goals, deadlines and quality standards, as well as undermining its image or reputation. HEALTH AND SAFETY RISKS Risks associated with the physical health and well-being of employees and third parties linked to the production process and the provision of services. One of Sacyr's priority objectives is to conduct its activities to the highest standards of safety and well-being throughout its value chain. G S G 77 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

Related risks • Litigation and civil liability arising from regulatory noncompliance by third parties. • Reputational harm arising from regulatory noncompliance by third parties. • Inadequate application of internal rules by third parties that might affect people's welfare or physical well-being. • Loss of productivity related to excessive dependence on critical suppliers. Action plans • Responsible Supply Chain Management Model. • ESG risk analysis of our value chain. • Identification of critical suppliers. • Assessment and approval of our supply chain. • Awareness and commitment to the supply chain. • Sustainability training plan for suppliers (Sustainable supplier training program). Opportunities • Nurturing of the Group risk culture in our supply chain. • Improvement in our position in ESG indexes. • Increased productivity. Corporate policies and procedures • Supply Chain Management Policy. • Human Rights Policy. • Quality, Environment and Energy Policy. For more information, see chapter 5.5 Supply chain of this report. SUPPLY CHAIN RELATED RISKS Possible adverse effects on the supply chain of the Sacyr Group derived from the lack or inadequate application of internal and external standards, as well as international reference guides, on the behavior and conduct of its supply chain (suppliers, contractors, etc.), with the aim of transmitting confidence to stakeholders and safeguarding its commitment to respect and protect human rights in the performance of its activity. Related risks • Physical risks: chronic and acute. • Transition risks: legal and political, technological, market and reputational. Action plans • Decarbonization Plan. • Energy efficiency: we foster practices that reduce the use of energy resources. • Renewable energy: we foster its use in our operations and develop infrastructure to generate energy from sources such as wind, solar, biomass and geothermal. • Sustainable mobility: we are committed to low-emissions urban mobility that is safe and accessible and that harnesses innovation and technology to drive the transformation. • Value chain: we reduce indirect emissions associated with our value chain by analyzing and implementing initiatives ranging from the acquisition of goods and services to waste generated in contracts. • Offset of emissions through the voluntary carbon credit market. • Adaptation Plan. Opportunities • Efficient use of resources. • Use of clean and alternative energy sources. • Development of new products and services. • Access to new markets. • Capacity for adaptation. Corporate policies and procedures • Quality, Environment and Energy Policy. • Climate Change Policy. For more information, see chapter 6.2 Climate Change of this report. CLIMATE CHANGE RELATED RISKS The Sacyr Group identifies and evaluates the risks and opportunities linked to climate based on various physical and transitional climate scenarios. The main axes of our climate change strategy are decarbonization and adaptation to be carbon neutral by 2050. E G E S G Integrated Sustainability Report - 2023 78 Related risks • Physical risks with a potential impact on Sacyr's operations. • Transitional risks: legal and reputational. • Systemic risks: ecosystemic and financial stability. • Climate risks linked to nature. • Dependencies on the use of resources. • Social welfare risks: human health, social cohesion, safety, mobility, cultural heritage, etc. Action plans • Natural Capital Action Plan. • Measurement and evaluation of natural capital in our projects. • Actions for the protection of fauna, flora and habitats. • Working groups and Biodiversity Committee. • Analysis of the risks and dependencies on natural capital and establishment of biodiversity conservation targets in all our contracts. Opportunities • Development of sustainable infrastructure/implementation of nature-based solutions. • Management of dependencies in the value

chain. • Capacity for adaptation. • Fundraising for the development of nature conservation and restoration projects. Corporate policies and procedures • Quality, Environment and Energy Policy. • Water Policy. • Biodiversity Policy. Other emerging risks Related risks • Loss of business opportunities due to lack of suitable staff. • Talent drain. • Constraints on business development and growth. • Deficient performance of operations and services. Action plans • Promotion as a benchmark employer brand in strategic markets and key profiles for the Group. • Reinforcement of internal controls in the process for the selection and evaluation of new recruits. • Forward-looking identification of critical profiles, needs and challenges and proactive management of internal talent. • Fostering the developing of all groups, strengthening transversality. • Support for initiatives that increase the loyalty of critical profiles by implementing measures aimed at caring for people and improving their experience as employees as an incentive to their ongoing commitment. • Fostering diversity, equity and sustainability. • Strengthening compliance with internal policies and labor regulations in all the countries where the Group operates. Opportunities • Attracting the best human capital. • Improvement of employee satisfaction. • Improvement in our position in ESG indexes. • Increased productivity. Corporate policies and procedures • Diversity, Equity and Inclusion Policy. • Policy regarding working hours and disconnection. • Regulations on Share Purchases (Spain). ATTRACTING, DEVELOPING AND ENGAGING TALENT Risks linked to the Group's talent management model aimed at preserving and enhancing our main asset, namely our people, throughout their career cycle, by means of a comprehensive development plan that guarantees the achievement of strategic goals. NATURAL CAPITAL RELATED RISKS The Sacyr Group remains committed to nature protection and conservation, analyzing the risks and dependencies on natural capital and locking biodiversity conservation objectives into 100% of new contracts. S G E S G 79 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Ruta 78. Chile Integrated Sustainability Report - 2023 80 5.4 Regulatory compliance 5.4.1 Code of Ethics and Conduct [2-23] [2-26] [3-3] [205-2] Our activity is governed at all times by the values, principles and guidelines for conduct established in the Code of Ethics and Conduct, approved by the Board of Directors, last updated on May 8, 2023. The Code establishes our commitment to the ethical values and principles that must guide our conduct and the conduct of our related third parties. It also sets forth the guidelines for governing our ad intra relations, with the market, society and nature. Likewise, it describes the bodies responsible for verifying compliance with the Code and establishes the channel for communication with them (Ethics Channel). Lastly, it details the consequences of breaching the Code, which may lead to the imposition of penalties as set forth in the applicable disciplinary system, including termination of the relationship with Sacyr. Its scope of application is company-wide, and is directly binding on all units or majority-owned companies (including Joint Ventures, consortiums, Temporary Business Associations, etc.) controlled directly or indirectly by Sacyr, S.A. and its Foundation. Similarly, its scope of application includes the directors and all staff (including management) of all the aforementioned Sacyr companies, as well as related third parties, who are required to behave in a manner consistent with it insofar as it applies to them. The Code and its implementation policies are available on our Intranet and on the Sacyr website (www.sacyr.com, "Compliance" section), and are also properly disseminated through other means, such as posters at work centers, the distribution of paper copies of it or its inclusion in contractual agreements, both to members of the Organization and third parties. In 2023, the Board of Directors of Sacyr, S.A. approved the modification of the Code of Ethics and Conduct and its implementing policies to bring them in line with the requirements of the new Law 2/2023 on the protection of persons reporting regulatory and anticorruption infringements. These modifications were disseminated through the channels provided

for the purpose and, over the year, training and information campaigns have also been implemented in connection with the Code of Ethics and Conduct and the main specific areas of it to all Sacyr personnel. Employees must adhere to the values, principles and standards of conduct established in the Code, and we confirm that 100% of key personnel at Sacyr have affirmed their commitment to do so. Moreover, all members of Sacyr's governing body have renewed this commitment in 2023, in connection with both the Code of Ethics and Conduct and its implementing policies, including those pertaining to crime prevention, anticorruption, antitrust and fair competition law. Similarly, training has been provided on regulatory compliance, covering different areas such as the Code of Ethics and Conduct, criminal liability of legal persons, anti-corruption, personal data protection, etc. During 2023 a total of 11,624 attendees were trained in these matters (10,043 in 2022 and 12,904 in 2021). Attendees were from all levels, including Sacyr's governing body, and they received an equivalent total of 8,608 training hours (12,680 hours in 2022 and 14,166 hours in 2021). Pajares Tunnels 81 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [2-23] [2-26] [3-3] [205-3] [206-1] [406-1] [411-1] At Sacyr we have an Ethics Channel (<https://www.sacyr.com/en/ethics-channel>) set up as the preferred method for company members and third parties (customers, users of our services, shareholders, suppliers, partners and any other stakeholders) to confidentially report, in writing or verbally, and also anonymously if they so wish, any potential breach of our Code of Ethics and Conduct and, in general, of our Regulatory Compliance Model for Criminal Prevention and Fair Competition, as well as any other applicable internal or external regulation, such as sexual or workplace harassment and gender-based harassment at our workplaces, any potentially corrupt conduct or going against fair competition, fraud or criminal actions, that may be detected. This channel is also designed for submitting queries on these matters. Complaints regarding matters included in the scope of application of this channel will be thoroughly and promptly investigated, independently and objectively (including those made anonymously) in accordance with the provisions of the General Policy concerning the Internal Information System. The Regulatory Compliance Unit, under the supervision of the Audit Committee, is the body responsible for receiving, processing and managing communications from the Ethics Channel, guaranteeing, at any event, protection of the identity and privacy of the persons affected, protection from reprisals of whistleblowers acting in good faith, compliance with legislation on personal data protection, a reliable and objective analysis of the possible infringement and the utmost respect for the presumption of innocence and safeguard for the honors of persons allegedly involved in infringements. These safeguards shall not apply in the event of deliberately false complaints filed in bad faith. In 2023, 2,205 people received training through the corporate tool in connection with the Ethics Channel, a specific newsletter was distributed regarding the operation of the Ethics Channel to 10,283 employees in 3 languages, and posters and infographics on this topic were disseminated. In 2023, 119 communications were received. The average response time was 3 calendar days. Of these communications: (i) 46 were classified as complaints on different grounds, and, having been investigated, were found not to involve breaches of human rights or corruption or antitrust regulations having a significant impact on Sacyr from a criminal, financial or reputational standpoint; and (ii) 46 complaints relating to alleged cases of harassment were identified, which were also subject to the relevant internal investigation process. Of the total number of communications received in 2023, 15 were anonymous (5 in 2022). Integrated Sustainability Report - 2023 82 Consultations 11 22 27 Complaints 74 73 92 Total number of communications received 85 95 119 2021 2022 2023 > Origin of the communications > Informant's relationship with the Sacyr Group > Classification of the communications by topic >

Communications received LATAM Spain Other Employee Ex-employee Other Harassment Conflicts of interest Working environment Consultations Code of Ethics Other* 23% 5% 72% 34% 3% 63% 15% 21% 13% 4% 4% 43% > Communication channels Ethics Channel E-mail Conventional mail Other 0 10 20 30 40 50 60 70 80 90 100 81% 16% 1% 2% * Other: This refers mainly to supplier complaints that are not processed in this channel. 83 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [2-23] [2-26] [3-3] [205-1] [205-2] [206-1] [IF-510a.3] The Audit Committee, which is supported by the Regulatory Compliance Unit (whose foundation and cornerstone is the Code of Ethics and Conduct) for its operational management, is responsible for the proper functioning of our Regulatory Compliance Model. It is the responsibility of the Regulatory Compliance Unit to investigate any indication of an infringement of our Regulatory Compliance Model. If the Model is confirmed to have been infringed, the internal procedures would be triggered, including the applicable disciplinary system, based on collective bargaining agreements or prevailing regulations. In any event, the Model will also be reviewed to implement improvements aimed at avoiding such non-compliances from being repeated. The Regulatory Compliance Unit's efforts in 2023 have focused on adapting said Model to the legal context and ensuring its continuous improvement. For this purpose, the actions carried out have revolved mainly around:

- Ethical corporate culture: In 2023, the topics of the training and communication activities carried out have been expanded, with 8 newsletters sent out concerning compliance matters, as well as other communications on new developments in the internal regulations of the Model. In total, each communication was sent to an average of 7,512 employees.
- Risk management: The Criminal Risk Maps and Integrity and Competition Matrices were reviewed and updated at the corporate level and in the main geographies where we operate, adapting them to regulatory changes, best practices and modifications in Sacyr's structure and/or activity.
- Third-party due diligence: We require that the third parties with whom we have dealings share Sacyr's commitments and our ethical culture. To this end, 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition we have internal due diligence procedures for our suppliers, partners and clients in order to avoid behaviors contrary to the standards established in the Code of Ethics and Conduct, including behaviors related to corruption. In 2023, we analyzed 1,164 third parties. Code of Ethics and Conduct and its implementing policies, including those issued in the area of regulatory compliance (crime prevention, anti-corruption, and antitrust and fair competition), are mandatory for third parties with whom we have dealings and are conveniently conveyed and communicated by including compliance clauses in our agreements with them. In December 2023, Sacyr S.A. obtained dual AENOR certification to standards UNE-ISO 37001 and UNE 19601, ratifying the company's adoption of best practices in anti-bribery and criminal compliance management systems. These certifications evidence the Sacyr Group's commitment to regulatory compliance and crime prevention. AENOR certification to UNE-ISO 37001 standard shows that Sacyr has an effective anti-bribery management system. ISO 37001 is the international standard laying out the requirements and it provides a guide to establish, implement, maintain, review and improve the mechanisms to combat potential bribery at companies. Furthermore, this certification helps organizations create a culture of integrity and transparency, improving their reputation. AENOR has also granted Sacyr certification of criminal compliance to UNE 19601 standard, Spain's standard concerning practical measures to prevent crimes, reduce risk and nurture an ethical and lawful corporate culture. Crime prevention measures The Policy Regarding Regulatory Compliance for Criminal Prevention formally enshrines Sacyr's commitment to comply with current legislation, in particular criminal law, building a strong corporate culture of regulatory compliance and criminal prevention at the Group. The Policy also

details the general principles followed to achieve this commitment. Integrated Sustainability Report - 2023 84 Anti-corruption and anti-bribery measures At Sacyr we have a range of policies and procedures in connection with anti-corruption, approved by the Board of Directors as a display of our firm commitment and zero-tolerance approach to any form of corruption, extortion or bribery, not allowing, authorizing or consenting, in any way or under any circumstances, any type of corrupt conduct within the framework of Sacyr's activities and its dealings with public and private entities. Specifically, our Policy regarding Anti-corruption and Relations with Public Officials and Authorities and the internal anti-corruption regulations (including various policies and procedures in connection with gifts and hospitalities, donations, sponsorships and conflicts of interest, among others) supplement two of the market behavior standards enshrined in our Code of Ethics and Conduct: the one concerning anti-corruption measures and the one referring to Sacyr's relationship with Governments and Authorities. These internal regulations thereby provide a detailed view of the control measures implemented to comply with the prohibitions included in the Code of Ethics and Conduct to prevent corruption:

- Prohibition of offering or accepting bribes.
- Prohibition of the use of donations, sponsorship, gifts and hospitalities as a means of carrying out concealed bribes.
- Prohibition of contributions for political purposes that contravene applicable local regulations.
- Prohibition of facilitation payments.
- Prohibition from making any expenditure, payment or transaction without the corresponding authorization, under the internal regulations, or any fraud in the accounting records due to the absence of records, inaccurate records or improper payments.

In addition to the employees who have received training on the Code of Ethics and Conduct (which includes anti-corruption measures), in 2023, 574 employees (1,250 hours)¹ received anti-corruption training. Likewise, 100% of Sacyr's key personnel renewed their express adherence to Sacyr's internal anti-corruption regulations, and other awareness activities were conducted, such as the mailing of newsletters on this topic to an average of 9,184 employees. Antitrust and fair competition measures Evidencing the commitment of the Board of Directors of Sacyr, S.A. to upholding competition regulations, a Policy regarding Regulatory Compliance for Competition Defence is in place, effectively developing one of the market behavior standards enshrined in our Code of Ethics and Conduct: the guideline concerning fair competition and antitrust. Evidencing that commitment and the principles put forwards in that Policy, an internal guide was drawn up which further develops the standards and best practices that must be followed by everyone at Sacyr. This guide is part of the Regulatory Compliance Model, whose key components are adapted in Spain to the Antitrust Compliance Program Guidelines published by Spain's National Commission for Markets and Competition (CNMC) on June 10, 2020. Furthermore, in 2023 the Competition Compliance Model was audited by an independent external expert, who concluded that the Model was suited to and aligned with the standards of international best practices on this topic. In 2023, 100% of Sacyr's key personnel have renewed their express adherence to the Policy regarding Regulatory Compliance for Antitrust and Fair Competition and the commitments undertaken therein. 1 A total of 1,250 hours of training were provided to staff at all levels, including 1 hour with respect to Sacyr's governing body. 85 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [2-23] [2-26] [3-3] The measures described above are also applicable to the anti-money-laundering and countering the financing of terrorism, but Sacyr also has specific policies and procedures in place to prevent this risk, especially in those companies that are bound parties in respect of the regulations in this area. The main measures in place are:

- Designation of a specific Internal Control Body responsible for supervising and enforcing measures to prevent regulatory breaches of these regulations.
- Updating, information and dissemination of the Internal Protocol in which the

policy and procedures are developed. • Existence of a system of software alerts to detect possible risky transactions. • Specific training in this area for employees and external collaborators. • Existence of the Ethics Channel for this area, available to members of the organization and third parties. No such communications were received through this channel in 2023. • Audits by independent external experts. • Third-party due-diligence processes. • Annual risk self-assessment analyses. [3-3] Our goal remains to minimize the risks associated with the processing of personal data, guarantee the protection of the related rights, for both our employees and third parties. Accordingly, we have policies and technical and organizational measures in compliance with the General Data Protection Regulation (GDPR) and Spain's Data Protection Act (Organic Law 3/2018 on Personal Data Protection and Guarantee of Digital Rights – LOPDGDD), including the: • Personal Data Protection Policy, approved by the Board of Directors. • Data Protection Officer (DPO). • Security and Privacy Committee to address data security and privacy from an integrated, and joint perspective. • Mandatory training sessions for all employees. • A specific channel for data subjects to send their queries or requests to exercise data protection rights. This channel can be accessed in English and Spanish, internally and externally, through an email account. In 2023, the Sacyr Group conducted a comprehensive update of the Review of Activities of Group companies; worked to prepare and publish the Corporate Risk Analysis and Impact Assessment Methodology in connection with Data Protection; strengthened the guarantees in the incorporation of privacy from the design phase and, on the international front, the Group continued devoting its best efforts to disseminating and supervising a homogeneous level of compliance. Furthermore, to reinforce the culture and awareness among our employees, 1,357 employees received training (271 hours) and newsletters are periodically sent out on different topics linked to personal data protection, with an average of 4,763 employees receiving each communication. These figures are included in the total number of the aforementioned compliance training and communication data. 5.4.4 Anti-money-laundering measures 5.4.5 Personal data protection Integrated Sustainability Report - 2023 86 [2-23] [2-24] [2-25] [3-3] [407-1] [408-1] [409-1] [411-1] The Ten Principles acting as the basis of the Sacyr Group's Code of Ethics and Conduct include those referring to human and labor rights, which we uphold everywhere we operate. They apply to all units and companies in which we are a majority shareholder, over which the company exercises effective control, directly or indirectly. In 2023, we obtained certification to two standards linked to human rights: SGE21 (ethically and socially responsible management system) and SA8000 (internationally recognized standard that establishes the conditions necessary for attaining a safe and healthy working environment, and a business strategy that protects social aspects relating to work). Sacyr's Human Rights Policy approved by the Board of Directors and updated in 2023, is aimed at defining the principles and mechanisms governing actions in this area and guaranteeing that any conduct not in keeping with this Policy is banished from our activities and operations. It is underpinned by the following basic values of International and EU Law, as well as other international standards in this regard: 1. The United Nations Charter, comprising: • The Universal Declaration of Human Rights (UN, 1948). • The International Convention on Economic, Social and Cultural Rights (UN, 1966). • The International Convention on Civil and Political Rights (UN, 1966). 2. The European Convention on Human Rights. 3. The United Nations Convention on the Rights of the Child. 4. The Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities (UN, 1992). 5. The International Labour Organization Declaration on Fundamental Principles and Rights at Work (ILO, 1998), the eight basic conventions that complement it and the Indigenous and Tribal Peoples Convention in Independent Countries. 5.4.6 Human Rights protection 6. The Declaration on the Rights of Indigenous Peoples (UN, 2007). 7. The Convention on the Rights of Persons with Disabilities (UN, 2006). 8. The European Union Charter of Fundamental Rights (2000). 9. United Nations

Human Rights Council's Resolution 48/13, of October 8, 2021, recognizing the human right to a clean, healthy and sustainable environment. 10. National constitutions and laws that recognize or apply human rights. 11. Social Accountability Standard SA 8000. Likewise, at Sacyr we are committed to conducting our business and professional activities in accordance with the laws in force in each of the places where we operate and we promote and encourage the same recognition and respect among contractors, subcontractors and suppliers. The Department of Corporate Social Responsibility (CSR) ensures that human rights are respected across all the activities conducted by the Sacyr Group, and apply to all units and majority investees with respect to which, whether directly or indirectly, it exercises effective control. Suppliers are a strategic part of our value chain and, therefore, when contracting their services, we assess the extent to which they are aligned with our ethical values and regulations, and we promote their adherence to them. In 2014, Sacyr signed a Framework Agreement with the International Federation of Construction and Wood Workers, Spanish trade union Comisiones Obreras (CC.OO.), and the Federation of Metal, Construction and Affiliated Workers of Spain's Unión General de Trabajadores (UGT-MCA). The signatories to this agreement undertake to respect and promote the principles defined in the Universal Declaration of Human Rights, the Tripartite Declaration of the International Labour Organization (ILO), the OECD Guidelines for Multinational Enterprises, and the Ten Principles of the UN Global Compact. 87 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices The Agreement establishes the following guidelines: All workers are entitled to set up and join trade unions if they so choose. At every work place the company will provide adequate facilities for the work to be carried out. Sacyr will respect the obligations towards all the workers established by the labor and social security laws and regulations, safeguarding workers' right to receive a minimum wage and promoting equal pay for equal work. All workers are entitled to equal opportunities and treatment without any distinction, exclusion or preference made on the basis of race, colour, sex, religion, political opinion, national extraction or social origin (ILO Conventions 100 and 111). We will respect children's rights and child labor will not be used. Only workers above the age of 15 years, or over the age of completion of compulsory schooling, if higher, may be employed (ILO Convention 138). Working hours must be established in accordance with national legislation and national agreements. All workers will receive at least one day-off per week or its equivalent in the case of an irregular working schedule, always as permitted by the prevailing legislation of each country. There is no forced or involuntary labor, including bonded labor. 1 9 11 3 5 7 2 Freedom of association and the right to collective bargaining are respected Workers' welfare Employment relationship Non-discrimination at work Child labor is not used Working hours are not excessive Employment is freely chosen Migrant and expatriate workers enjoy the protection and conditions established by the existing national legislation. Agencies that send workers to other countries will be required to repatriate these workers when their employment terminates. Workers will be paid wages and benefits that must conform, at least, with the conditions of the national legislation or the collective bargain applicable to the sector or industry in question. Sacyr undertakes to provide the means to contribute to its employees' learning and training and to update their knowledge and skills. A safe and healthy working environment will be provided. 4 6 10 8 Protection of migrant workers Living wages are paid Specialized training Workers' health and safety Human rights Integrated Sustainability Report - 2023 88 Accordingly, we have provided employees with a new corporate intranet page called "CSR and Social Impact" where they can download and consult documentation related to our commitment to human rights. At Sacyr we publish the annual commitment to implement all necessary measures to combat slavery and human trafficking, as outlined in the Group's Modern Slavery Statement UK & AUS. In

this regard, in 2023 we carried out operations subject to human rights impact assessments or reviews in 100% of the projects Sacyr was involved in. Furthermore, 100% of the new agreements signed under contract contain specific clauses concerning human rights. Notably, in 2023 no operations have been identified with significant risk of child, forced or compulsory labor, nor have any cases of breaches of the rights of indigenous peoples, migrants or human rights in general, been identified during the course of our operations. With regard to the management of human rights-related risks, risk maps (operational) identify existing risks (managed via the control procedures established to mitigate them), such as relationships with local communities or social instability, which also include those related to human rights in the course of the company's business. At Sacyr we are committed to guaranteeing land rights in relation to the resettlement and recovery of the livelihoods of local communities. Jorge Chávez International Airport In 2023, we conducted human rights awareness and training initiatives for all Sacyr employees through the various available formats and internal communication channels (newsletters, apps, intranet), as well as the "Sacyr Explora" training platform, on which we launched the first edition of the specific Human Rights course for all employees. This course was passed by a total of 1,657 employees, which represents more than 30% of the employees enrolled.

5.4.7 Human rights training Along with the United Nations Global Compact, we have launched sustainability and human rights training for our main suppliers with the aim of raising their awareness on the importance of human rights and their impact on the supply chain. Also worth noting is that in 2023 we updated the Ethics Channel and at the same time the Code of Ethics and Conduct of the Group, a process culminating in specific training to workers with regard to the latest developments.

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5.4.8 Security personnel trained in human rights procedures [3-3] [410-1] Sacyr's Corporate Security Policy specifically states our "Commitment to implementing a global security program at all Group companies, in order to create and maintain a safe working environment for staff, with a view to guaranteeing the safety of our employees, assets, operations, information and reputation, while ensuring that security-related measures are fully compliant with the law and respectful of human rights". This Policy is consistent with Sacyr's commitment to ensuring that human rights are scrupulously respected within our organization. Sacyr has a corporate security office where all employees are qualified as "private security personnel" and are therefore bound by and obliged to comply with the professional code of ethics private security based on the principles of legality, integrity, dignity, protection, concurrence, proportionality, collaboration with the police and security forces, citizen collaboration and professional secrecy. The Corporate Security Office is responsible for ensuring that all persons involved in Group security carry out their work in accordance with and respecting these standards, ensuring that the operational personnel of the surveillance and security services have the necessary training in human rights. For this purpose, it is our job to choose only those security firms to provide services to our offices and projects that have policies on human rights, equity training, commitment to the code of ethics, etc. Lastly, Sacyr also urges members of the security services to respect the right to privacy and confidentiality of the information they may handle to carry out their work. Both the operation of the access control system and the viewing of the cameras shall be carried out in strict compliance with the law and with respect for privacy. The use of weapons is not covered by our services.

A3 Olivieri Integrated Sustainability Report - 2023 90 5.5 Supply chain [2-6] [3-3] [414-1] [414-2] Part of our sustainability endeavors consist of incorporating our environmental, social and governance values (ESG) throughout the supply chain. We have a variety of supplier typologies due to our wide range of activities. By volume of expenditure, our most significant suppliers are those related to the assembly of

facilities and the power supply, as well as construction materials, especially those from whom we source steel, concrete and cement, asphaltic materials and aggregates. [407-1] [408-1] [409-1] Our commitment to responsible supply chain management is expressed at the most senior level, by the Board of Directors, through the Sustainability and Corporate Governance Committee and the Sustainability Committee, by approving the Supply Chain Management Policy, which sets out the processes for managing the risks associated with the procurement, acquisition and sourcing of supplies and services.

5.5.1 Sacyr's Responsible Supply Chain Management Model

At Sacyr we expect our suppliers to comply with the regulations in each geographical area, as well as with our policies and commitments, since we all belong to the same team. Accordingly, our suppliers must accept and comply with our Code of Ethics and Conduct, our policies on anti-corruption, fair competition and crime prevention, as well as the Sustainability Policy Framework and the other related policies which refer to human rights, diversity and inclusion, environment, health and safety and the supply chain. The Code of Ethics and Conduct, policies and other documents that suppliers undertake to adhere to are available on Sacyr's website and in the specific section for our suppliers. All contracts with our suppliers include clauses linked to our environmental, social and governance principles, which they must take on as their own. Furthermore, all contracts include an environmental and energy commitment stating the need to know and comply fully with the current legal environmental regulations that directly or indirectly affect the object of their activity, as well as the importance of reporting any incident potentially having an impact on the environment during the course of the execution of the contract. Likewise, at Sacyr we have measures in place to ensure that the suppliers we select fulfill due diligence, technical and professional criteria, avoiding corrupt or anti-competitive practices. We regularly review our due diligence processes to ensure we are properly monitoring our contractors.

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To continue improving our procurement process, we have launched a new suppliers site called *Ágora*, to facilitate and expedite collaboration between both parties. This is a part of the GeOS project site and services management tool for all processes required to complete a purchase or order in accordance with Sacyr's criteria, including the supplier assessment. It is of key importance that the entire procurement process is in a single tool, to optimize the quality of data on our suppliers and the process automation. Furthermore, suppliers will have access to this portal where they will be able to perform the following actions:

- Consult the addresses and contacts that Sacyr has.
- Manage portal user accounts.
- Share documentation on demand.
- Complete outstanding surveys.
- Consult their invoice history.

Administration Processing of assessments
My invoices

This tool is being phased in, starting with the Engineering and Infrastructure unit, and it is scheduled to be implemented at other areas of the company in 2024. In addition, work is ongoing to create a supplier database including suppliers that have been assessed by Sacyr in the last three years, compiling information and requirements to know them better. In order to identify and curb inadequate practices, at Sacyr we carry out supplier approval measures that involve controls and evaluations, including a risk analysis. The performance of indicators relating to the supplier approval and assessment process is influenced by the change in the organizational perimeter as compared to 2022.

Forced labor
Child labor
Local communities
Slavery
Workers' conditions
Good health and well-being

Refrain from using forced or coerced labor. Refrain from using child labor or incorporating into its business activity any product or service derived from child labor in any of the countries in which it operates. We avoid complicity in land rights infringements. Implementing the necessary measures to combat slavery and people trafficking. Sacyr's Modern Slavery Statement (UK & AUS), sets out the steps we have taken to

ensure that slavery and human trafficking do not take place in our supply chain. • Prevent infringements of the basic rights of outsourced employees. • Respect our suppliers' right to freedom of association and collective bargaining. • Support the right to a living wage. Support the right to a minimum or living wage and monitor compliance with local minimum wage laws. • Promote the reduction of excessive working hours. • Respect the rights of all workers, especially migrants in especially vulnerable situations. • Establish contractual fair payment conditions and delivery lead times that allow our suppliers to comply with basic labor standards. Provide a safe, healthy and organized work environment to prevent accidents and injuries. Thus, we encourage our suppliers to take measures based on: Adoption of the UN Global Compact 1 Principles. Obtaining certifications in Ethical and Socially Responsible Management 2 and Environmental Management. 3 Ensure decent conditions: Integrated Sustainability Report - 2023 92 Since 2022 we have been conducting ESG risks analyses of our portfolio of main suppliers using the Moody's Supply Chain Catalyst tool, taking into account all the projects we execute. This analysis considers criteria such as scale, length of business relationship, industry, geographical presence and total expenditure of each of the suppliers as the initial methodological basis for screening. In 2023 we reviewed the initial screening methodology to improve the efficacy of supplier segmentation according to their criticality, which resulted in an analysis of a total of 1,170 suppliers of the entire Group (1,052 in 2022), through an external screening platform. We continue to base the analysis on 6 ESG risk subcategories and 37 material topics for infrastructure management. The analysis yielded a total of 37 critical suppliers. Once critical suppliers have been identified an evaluation questionnaire is shared with them to determine areas for improvement. Lastly, the results are analyzed by experts so as to establish measures that reflect Sacyr's standards and values, thereby promoting a productive and lasting relationship. This risk analysis equips us to determine a series of priorities in our approach to supply chain supervision, based on supplier criticality. These priorities range from proposed remedial measures to supplier audits, as well as essential control initiatives to guarantee the sustainability of Sacyr's operations and services.

5.5.2 ESG risks analysis > ESG criteria – Material Topics Environmental sub-category Business conduct sub-category Human Resource sub-category Environmental strategy Product safety Social dialog Pollution prevention and control Customer information Employee engagement Green products and services Customer relations Reorganization Biodiversity Sustainable supplier relations Professional development Water Environmental standards in the supply chain Remuneration system Energy Social standards in the supply chain Workplace safety Air pollution Corruption Working hours Waste management Antitrust activities Local pollution Lobbying Transportation and use of products and their rights Human rights sub-category Corporate governance sub-category Community impact sub-category Human rights Board of Directors Social and economic development Labor rights Internal control and audit Social impact of products and services Diversity and Anti-Discrimination Policies Investors Philanthropy Forced labor and child labor Remuneration of executives 93 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [3-3] All our suppliers must undergo an approval process to ensure that we work with companies that meet the minimum criteria established in our general procurements procedure. In this process, we initially assess suppliers on the basis of environmental criteria (environmental and energy certificates, eco-labels, calculation of their carbon and water footprints and whether they carry out biodiversity activities) and social criteria (their adherence to the United Nations Global Compact, having projects that benefit the community, being a proximity supplier). In 2023, 59.0% of our new suppliers met our environmental 5.5.3 Supplier evaluation and approval and social requirements. We prefer to hire local suppliers (headquartered in the country where the contract

is executed), who currently account for 98.40% of the total (97.06% in 2022). Audits are a powerful tool for controlling and monitoring our suppliers' performance. In 2023 we audited 23 suppliers (19 in 2022). In 2023, we examined the environmental performance of 1,441 suppliers. Taking into account those suppliers that have been evaluated as having a negative environmental impact (53 suppliers), improvements were agreed with 50.94% and the relationship was terminated with the other 49.06%. Suppliers' social performance is examined through internal audits, the analysis of complaints received and the assessment of social impacts included in the final supplier evaluations. [308-1] [414-1] > New suppliers that have passed the environmental and social screening filters Initially assessed suppliers 1,227 1,087 752 Suppliers meeting environmental and social criteria 961 746 444 Suppliers meeting environmental and social criteria (%) 78.3% 68.6% 59.0% 2021 2022 2023 [308-2] [414-2] > Negative environmental/social impacts on the supply chain Suppliers whose environmental and social impacts has been assessed 2,804 3,061 1,441 No. of suppliers assessed as having significant negative environmental impacts 42 66 53 % of suppliers with actual and potential significant negative environmental impacts with whom improvements have been agreed upon following the assessment 47.62% 45.45% 50.94% % of suppliers with actual and potential significant negative environmental impacts with which the relationship has been terminated following the assessment 52.38% 54.55% 49.06% No. of suppliers assessed as having significant negative social impacts* 0 0 14 % of suppliers with actual and potential significant negative social impacts with whom improvements have been agreed upon following the assessment 0% 0% 21.3% % of suppliers with actual and potential significant negative social impacts with which the relationship has been terminated following the assessment 0% 0% 78.57% 2021 2022 2023 * The change in the number of suppliers with significant negative social impact is due to the broadening of the supplier evaluation criteria in 2023. Integrated Sustainability Report - 2023 94 In addition to the Supply Chain Management Policy, in 2021 we produced a Buy Green Recommendations Guide, which we updated in 2022. This guide compiles suggestions about how to buy more environmentally friendly products and materials. The people responsible for managing purchases in Sacyr's procurement departments receive training in this sphere to ensure that they take into account the commitments relating to suppliers. Furthermore, we raise our suppliers' awareness by delivering and explaining to them the Good Environmental Practices Handbook, as well as providing them with other training on waste management, water management, biodiversity care, etc. In 2023, we offered our suppliers 49,745 hours of training (71,961 hours in 2022), and attendances numbered 68,8231 (68,771 in 2022). To meet the 2030 target defined in the Climate Change Strategy, namely to slash Scope 3 emissions by 25%, we are committed to measuring and reducing emissions in the value chain. To achieve this, we choose low-carbon suppliers and develop collaboration programs to mitigate the emissions associated with our commercial relationships. To learn more about our decarbonization strategy, see chapter 6.2.3 Strategy. Our Corporate Social Responsibility (CSR) Area in collaboration with the United Nations Global Compact provided human rights training to a total of 141 suppliers in our supply chain. The goal was to train them in specific sustainability topics, and the training lasted 5 months and was divided into 4 modules: a) General aspects of sustainability. b) Sustainable Development Goals. c) The Ten Principles of the UN Global Compact. d) Incentives and communication. The results proved very satisfactory for our suppliers, who were able to get a closer picture of sustainability trends and requirements. 5.5.4 Awareness and commitment to the supply chain From the Madrid Municipal Government's Center of Innovation for the Circular Economy (CIEC), Sacyr coordinates the business Circularization Programs aimed at providing them with training and help in strategically incorporating the circular economy into their value chains. The Construction Sector Circularization Program, launched in 2023, has allowed us to add new suppliers to our value chain in accordance with

our Circular Economy Policy and the Sustainable Sacyr Plan. All of this with the aim of contributing to the goals of the Spanish Circular Economy Strategy (Circular Spain 2030). 1 By "attendance" we mean the sum of people who have been present at the environmental training sessions. Jorge Chávez International Airport. Peru 95 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 5.6 Sustainable investment

The development of sustainability-linked financial instruments was one of the notable milestones the Sacyr Group set itself in its commitment to sustainability in the new strategic cycle. In 2021 and 2022, ahead of the initial deadline, Sacyr demonstrated its commitment and capacity in this area through five operations involving sustainable finance instruments that at the same time reduced its recourse debt and strengthened its capital structure. These include the first social bond linked to an infrastructure project in Latin America (2021) and the largest social bond at that time linked to infrastructure in that region (2022). In 2023, Sacyr created the Sustainable Financing Framework as a tool to foster transparency, disclosure and integrity in its sustainable finance initiatives, as well as maintaining the highest international sustainability standards and guaranteeing reporting rigor and quality. Accordingly, the company was advised by CaixaBank CIB&IB, and obtained a favorable second-party opinion (SPO) from rating agency Standard & Poor's, which acted as an independent observer. The framework has a highly innovative sphere of application, since it covers financial instruments like bonds or loans and transactional banking products (leasing, guarantee facilities, etc.), green and social, as well as a KPI for the reduction of CO2 emissions. In 2023, Sacyr also issued its third social bond in Colombia which, once again, edging out its own previous bond, was the largest in Latin America linked to an infrastructure project. Montes de María. Colombia Integrated Sustainability Report - 2023 96 LatinFinance Award in Local Currency Financing of the Year category (2021) SOCIAL BOND (2021) The first social bond issued in Latin America linked to an infrastructure project, worth US\$209 million and maturing in 24 years, to refinance the Montes de María road project (Colombia). Sacyr Concesiones, through Concesionaria Vial Montes de María, is in charge of the operation and maintenance of the Fourth Generation (4G) Puerta de Hierro – Palmar de Varela and Carreto – Cruz del Viso port cities corridor. The road corridor, spanning 198 kilometers, connects the main ports and cities of the Colombian Caribbean. This issue is backed by the United States International Development Finance Corporation (DFC) and the social bond categorization is verified by a third party based on the criteria defined by the ICMA (International Capital Markets Association) "Social Bond Principles 2020". Among other factors assessed is the positive impact that the project will have on the communities located in its impact area as a result of the proceeds from the issuance. The project includes the installation of Smart Transport Systems (STS) to enhance communication and safety for users of the road. GREEN SECURITIZATION FUND (2021) €104 million bond issue by the Sacyr Green Energy Management Securitization Fund, admitted to the fixed income market (MARF). The fund is comprised of the present and future economic rights derived from the operation and maintenance contracts of five cogeneration plants, two biomass plants and two industrial olive pomace oil extraction plants in Andalusia, operated by the Sacyr Industrial Operation and Maintenance (SIOM) unit. These securitized bonds are aligned with ICMA's Green Bond Principles, as endorsed by G-Advisory, and have an A- score from Axesor Risk Management. US\$209 Million €104 Million SOCIAL BOND (2022) Issuance by Sacyr of its second social bond in Colombia. Concesionaria Vial Unión del Sur, headed by Sacyr Concesiones and Sudinco, has successfully obtained long-term social financing for the 4G Rumichaca-Pasto project in Nariño, on the ColombiaEcuador border, with a US\$262 million social bond. The social bond was more than two-times oversubscribed. The issue was rated Baa3 and BB+ by rating agencies Moody's and Fitch, respectively. It matures in 19 years, i.e. in February 2041.

Categorization as social bond and loan is subject to an evaluation and analysis process by an external auditor (Moody's ESG Solutions), which verifies that the bond and loans are consistent with the basic Social Bond Principles 2021 of the International Capital Market Association (ICMA) and the Social Loan Principles 2021 of the Loan Syndications and Trading Association (LSTA). Among other factors assessed is the positive impact that the project has on the communities located in its impact area as a result of the proceeds from the issuance. The Rumichaca-Pasto project in the Nariño Department, at 83 km-long, will boost the country's road connectivity, specifically on the border crossing with Ecuador, thereby fostering the social and economic growth of south-western Colombia. Likewise, it will reduce journey times and costs, directly impacting more than 550,000 inhabitants of the 7 municipalities along the road corridor: Ipiales, Contadero, Iles, Imués, Tangua, Yacuanquer and Pasto. US\$262 1 3 Million 2 LatinFinance Award in the Infrastructure Financing of the Year - Andes category (2022) Longitudinal de la Sierra Highway. Cajamarca. Peru 97 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices SYNDICATED LOAN (2022) Arrangement of a syndicated loan with 14 financial institutions to refinance €355 million in corporate debt. The refinancing is in two tranches, a €280 million, five-year loan and a €75 million, three-year revolving credit facility, which may be extended for up to two additional years. In this operation, Sacyr undertakes sustainability and safety commitments based on the definition of targets for the reduction of CO2 and the accident rate, whose fulfillment or non-fulfillment entails a small price adjustment. €355 Million SOCIAL BOND (2023) Issuance of Sacyr's third social bond in Colombia and the largest in Latin America linked to an infrastructure project, worth US\$400 million. The bond is linked to the refinancing of the 4G Pamplona-Cúcuta road project (Colombia). Categorization as social bond and loan is subject to an evaluation and analysis process by Moody's ESG Solutions, which verifies that the bond and loans are consistent with the basic Social Bond Principles 2021 of the International Capital Market Association (ICMA) and the Social Loan Principles 2021 of the Loan Syndications and Trading Association (LSTA). Among other factors assessed is the positive impact that the project has on the communities located in its impact area as a result of the proceeds from the issuance. The P3 company Unión Vial Río Pamplonita, 100% owned by Sacyr Concesiones, is heading this project that spans 62.2 km. The project will improve road connectivity in the country, and specifically on the border crossing with Venezuela, thereby boosting social and economic development in north-east Colombia. Furthermore, it will reduce journey times and costs, directly impacting more than 782,000 people in the region. Multiple activities have been carried out as part of the socio-environmental programs, notably including training and skill building, tree planting, support for production projects, enterprises, health brigades and others. In keeping with our Sustainable Financing Framework, this social bond is included in the category of Basic affordable infrastructure – Transportation infrastructure. The target population includes communities in the five project municipalities (Pamplona, Pamplonita, Bochalema, Chinacota and Los Patios), but also the entire Norte de Santander department, including the city of Cúcuta. It also has an impact on the communities closest to the border with Venezuela, and the traffic flowing towards the neighboring department of Santander and its capital, Bucaramanga. US\$400 4 5 Million Rio Pamplonita. Colombia Integrated Sustainability Report - 2023 98 AGMK Sacyr Almería 5.7 Tax transparency 5.7.1 Our tax model [3-3] [201-4] [207-1] [207-2] [207-3] The Board of Directors of Sacyr updated the Corporate Tax Policy in 2023, based on the general principles of legality, transparency and responsibility. These principles are in line with the 2021-2025 Sacyr Sustainable Action Plan, as we are committed to contributing to the social and economic development in the countries where we operate. This tax commitment is embodied by compliance with all tax obligations and, in particular, through the

tax paid in all the territories where the Group has a presence. All Group companies comply with the applicable tax reporting and transparency rules in each country. Specifically, in Spain, Sacyr adhered in 2011 to the Code of Best Tax Practices promoted by the Tax Authority. We are also a member of Asociación de Empresas, Constructoras y Concesionarias de Infraestructuras (SEOPAN), and equivalent sector organizations in the countries where the Group operates, fostering consultations with the authorities, adjustments to existing tax regulations and regulatory developments. Sacyr is committed to not creating or acquiring interests in entities domiciled in countries or territories considered to be tax havens, and to avoiding any other transactions or operations of a similar nature that have as their sole purpose to reduce tax payments, the complexity of which could undermine the Group's transparency, and which are unrelated to the corporate activity. The Group has approved a Transfer Pricing Tax Policy and values transactions with its investees and related parties on an arm's length basis in accordance with OECD Guidelines. All Group companies comply with the applicable tax reporting and transparency rules in each country.

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Colombia 10.1% For every €100 in revenues, €14.89 are spent on taxes.
9% Collected
6% 33% 31% Engineering and Infrastructure Paid
P3 Holding company
11% 15% By business
By country
Sacyr's Board of Directors, in compliance with mercantile legislation, is the body in charge of defining the corporate tax strategy and policy and ensuring its compliance, establishing for this purpose the necessary management, control and supervisory systems. Similarly, among many other functions, it determines the tax risk control and management policy, and it approves investments and operations of all kinds that, because of their large amounts or special characteristics, are strategic or of special tax risk, unless their authorization is in the Annual General Meeting agenda.

Spain 50.5% Chile 14.1% Peru 9.9% Portugal 3.0% Italy 2.2% Uruguay 2.1% USA 1.6% Paraguay 1.5% Algeria 1.2% Brazil 2.0% Rest 1.9%
Total Tax Contribution in 2023: €691 million.

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100 Tax paid
Tax collected
Tax category (€ M)
I. Income tax 44 50 71 8 14 19
II. Property tax 8 8 7 1 0 0
III. Taxes associated with employment 203 192 158 167 169 179
IV. Taxes on products and services 27 30 47 129 183 199
V. Special taxes 8 5 9 3 1 2
Total 290 286 292 308 367 398

The Corporate Tax Department is responsible for managing the Group's taxation, guiding and supervising the actions of the tax teams in all business units, ensuring the implementation of tax risk control mechanisms to comply with applicable regulations. To achieve this it has a Tax Risk Control and Management System aimed at establishing the scope, governance model and operating principles to ensure that tax risks are properly managed.

2021 2022 2023
Lav León-Asturias. Pajares Tunnels. Campomanes
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5.7.2 Tax contribution (201-4) (207-4)
In strict compliance with its tax and fiscal transparency obligations, the company files an annual Country-byCountry Report with the tax authorities. The Total Tax Contribution (TTC) of the Sacyr Group for the year 2023 is presented below, including all the territories in which the company is present, showing the contribution to economic, social and environmental development in those territories and stakeholders involved.

	Profit/loss before tax	Income tax	Other tax paid	Tax collected	Public subsidies
Figures in € M					
EUROPE	102.10	412.14	-19.28	33.61	23.02
	16.22	149.72	183.10	198.05	206.77
	201.30	217.93	1.08	2.24	2.46
Spain	-234.07	57.19	-170.51	29.25	15.93
	11.79	132.75	168.83	183.14	186.90
	182.14	190.47	1.08	2.24	2.46
Ireland	27.27	4.69	1.26	0.08	0.06
	0.07	0.13	0.11	0.17	0.67
	0.78	0.54	0.00	0.00	0.00
United Kingdom	-0.41	-17.88	0.61	0.01	0.18
	0.01	0.24	0.60	0.22	2.63
	5.38	3.31	0.00	0.00	0.00
Portugal	-22.78	-42.42	-31.88	0.52	0.39
	0.18	4.48	4.30	4.99	15.46
	12.07	5.69	0.00	0.00	0.00
Italy	363.51	410.83	181.25	3.67	6.37
	4.16				

11.60	8.88	9.40	0.27	0.51	17.80	0.00	0.00	0.00	Rest	-31.42	-0.27	-0.01	0.09	0.09	0.01	0.52	0.39	0.13	0.84																																																																																																																																																																																															
0.41	0.12	0.00	0.00	0.00	NORTH AND SOUTH AMERICA	358.00	91.60	43.05	24.46	19.00	23.03	74.79	58.87	50.26	188.82	163.55	89.30	0.11	0.25	0.67	Bolivia	-3.34	-0.90	-1.36	0.01	0.07	0.02	0.64	0.64	0.22	0.16	0.03																																																																																																																																																																																		
0.00	0.00	0.00	0.00	Brazil	2.77	-0.72	-0.29	6.07	0.11	0.20	4.51	2.52	3.59	3.23	1.99	0.64	0.00	0.00	0.00	0.00	Canada	0.55	-2.22	-2.84	0.00	0.00	0.26	0.11	0.08	0.06	0.50	0.01	0.04	0.00	0.00	0.00	Chile	70.91	56.69	18.72																																																																																																																																																																										
-1.23	1.68	7.44	27.95	16.66	6.14	70.96	56.44	34.30	0.11	0.25	0.67	Colombia	195.73	-2.87	-12.20	12.15	8.64	8.38	24.84	23.13	29.24	32.53	24.21	23.92	0.00	0.00	0.00	Ecuador	-0.03	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	USA	-16.51	-20.10	-9.55	0.07	0.03	0.00	3.27	3.06	1.85	7.52																																																																																																																																																																	
5.25	4.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	USA	-16.51	-20.10	-9.55	0.07	0.03	0.00	3.27	3.06	1.85	7.52	5.25	4.40	0.00	0.00	0.00	Mexico	26.08	11.41	12.82	0.41	0.00	1.17	1.13	0.79	0.52	0.82	8.77	6.29	0.00	0.00	0.00	0.00	Paraguay	33.66	12.36	5.94	0.27	0.33	0.13	1.46	1.44	1.42	8.35	4.40	1.99	0.00	0.00	0.00	0.00	Peru	11.29	7.45	9.20	6.69	6.68	3.62	6.43	8.01	3.88	55.03	53.61	13.35	0.00	0.00	0.00	Uruguay	37.01	30.81	22.81	0.02	1.46	1.81	4.46	2.52	3.34	9.72	8.83	4.37	0.00	0.00	0.00	Rest	-0.12	-0.27	-0.19	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	AFRICA AND THE MIDDLE EAST	6.98	10.73	-3.44	7.91	0.19	0.07	1.03	0.22	0.05	0.29	0.07	0.07	0.00	0.00	0.00	Oman	-1.03	3.45	-3.67	0.19	0.17	0.00	0.87	0.14	0.00	0.16	0.05	0.00	0.00	0.00	0.00	0.00	Rest	8.01	7.28	0.23	7.72	0.03	0.07	0.17	0.09	0.05	0.13	0.02	0.07	0.00	0.00	0.00	OCEANIA AND ASIA	1.75	0.82	13.33	0.59	1.47	0.72	0.25	0.07	1.17	2.31	1.85	1.08	0.00	0.00	0.01	Australia	1.75	0.82	13.33	0.59	1.47	0.72	0.25	0.07	1.17	2.31	1.85	1.08	0.00	0.00	0.01	Total	468.83	515.29	33.66	66.58	43.68	40.04	225.79	242.26	249.53	398.19	366.76	308.38	1.18	2.49	3.14	*	All tax actually paid during the year is counted. Income tax accrued in the period but payable in the future is not included. Income tax includes the amount of installment payments, tax paid for the year, and tax withheld at source by customers. ** The amount of other tax paid includes the company's contributions to Social Security and other taxes. *** Tax collected include VAT collected, employment tax and employee Social Security contributions.

2023 2022 2021 2023 2022 2021 2023 2022 2021 2023 2022 2021 2023 2022 2021 Integrated Sustainability Report - 2023 102 5.8 Cybersecurity At Sacyr, as part of our 2021-2025 Strategic Plan, we define digitalization as a key aspect for developing business processes and their underpinning information systems. Considering the complexity and variety of the latest technological ecosystems, cybersecurity will unquestionably be a fundamental part of ensuring proper risk management and the continuity of our business operations. Cybersecurity threats are increasingly significant, so we are in a continuous process of adapting our security strategy and capabilities to respond to more complex threats related to cloud architectures and services, and mobile connections. At Sacyr we have an Information Security Policy applicable to all business units, that was updated in 2022 and approved by the Board of Directors. This update covers other dimensions within the Information Security Management System, with a view to guaranteeing the confidentiality, integrity, availability, authenticity and traceability of information, protecting data and information systems against unauthorized access, sharing and modifications. Sacyr sees the cybersecurity associated with its services as one of the key factors when carrying out its activities, to ensure adequate levels of protection and resilience of the information and the systems on which it is supported. The principles governing our actions in this area are included in the Cybersecurity Policy, approved by its Board of Directors. This policy covers, as part of the Sacyr Group's strategic policy, the development of a cybersecurity management model based on the identification, protection, detection, response and recovery of information systems, with Senior Management releasing the necessary resources to achieve this. Our cybersecurity function is aligned with international best practices and standards, such as the NIST (National Institute of Standards and Technology) Cybersecurity Framework. In turn, we are guided by the principle of continuous improvement, certifying the Information Security Management Systems through periodic external audits to ensure the implementation of controls and

security measures. In this regard, we have obtained:

- Certification to ISO 27001 Information Security Management Standard, accredited annually by AENOR, in accordance with UNE-ISO/IEC 27001:2014, which contributes to promoting data protection activities, generating trust in respect of third parties.
- Biannual certification in the Spanish National Security Scheme (ENS), created and promoted by the Spanish National Cryptology Center (CCN), which seeks to protect the privacy of citizens' data stored within Sacyr's information systems when they carry out electronic procedures. We have an Executive Cybersecurity Committee that meets twice a year and is the body that facilitates the monitoring and continuity of the Information Security Program. At the operating level, at Sacyr we have a CIO (Chief Information Officer) who is the ultimate authority on the Group's global technology strategy and reports directly to the Executive Committee through the Chief Operating Officer. Furthermore, at Sacyr we have a CTO (Chief Technology Officer), responsible for the strategy and operation of the systems and cloud, and a CISO (Chief Information Security Officer), responsible for cybersecurity strategy and operation. Both the CTO and the CISO report directly to the CIO. In addition, a community has been built through various Committees, comprising the business lines and the Technology Department, to ensure transversal cybersecurity across each of the processes and information systems. In order to comply with all aspects of information security, Sacyr's Board of Directors has an independent director with experience in this area, to ensure the proper monitoring and optimization of mature cybersecurity throughout the organization, by means of the strategy, the Security Master Plan and the analysis and treatment of the main security risks and threats facing Sacyr. This independent director is periodically informed by those responsible for the main aspects in this sphere.

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At Sacyr we aim to ensure that all employees and collaborators are the first line of defense against cyber threats, and we encourage the entire Group to make information security central to their way of working, to incorporate information security procedures in each of the businesses. In this regard, we continue to reinforce a culture of protection against cyberattacks through periodic and mandatory awareness programs on information security. We are working on a training plan accompanied by practice drill exercises, with a view to:

- Reducing information security risks and incidents
- Complying with regulatory requirements
- Complying with the Organization's Internal Policies

In addition, recommendations, global cyberincidents, news and other corporate guidelines on cybersecurity are shared with all employees. We have compiled the Ten Principles of Cybersecurity, containing basic security recommendations for all employees in their work, with the aim of protecting their credentials, devices, web browsing, e-mail, workspace, etc. Likewise, employees from the Technology Department have set cybersecurity-related objectives as part of the annual Performance Management Process. Moreover, all Sacyr employees are obliged to know and uphold the main information security regulations, and to make appropriate use of Sacyr's technological resources. We apply Artificial Intelligence solutions to user accesses and alert management. We also deploy solutions to protect user workstations against sophisticated attacks and ransomware, as well as measures to protect digital identity, access to software and data through two-step verification mechanisms, with the focus on systems administration. We conduct planned actions aimed at minimizing vulnerabilities related to technological obsolescence. Sacyr has set up a CyberSOC (Cyber Security Operation Center) that covers all security events through the detection of anomalous behavior by means of alerts. We have a Cyberincident Management Procedure based on the National Guide to Cyberincident Notification and Management, on ISO 27035 standard and on procedure NIST.SP.800-61r2. We have identified the main information systems and classified them by criticality for each business line, in order to define the Business

Continuity and Cyberincident Recovery Plans with which to respond to disruptive events. The crisis management procedure involves different technical and functional areas at Sacyr in accordance with the specific protocols of each of the information systems characterized. Response and recovery plans are practiced through annual drills. Furthermore, in the framework of ISO 27001 a vulnerabilities analysis is carried out by a third party, as well as ethical hacking simulations. On the other hand, there are mechanisms for all Sacyr employees to report any incident or suspicious event in the organization's information systems. Likewise, suppliers working with Sacyr are contractually obliged to report any incident related to or potentially affecting the company's assets. At Sacyr we structure all our developments on platforms that ensure developmental quality and security throughout the software development and implementation life cycle. Dev Ops Sec Integrated Sustainability Report - 2023 104 6 Planet ambition 105 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.1 Our environmental commitment 106 6.2 Climate change 116 6.3 Circular economy 135 6.4 Natural capital 155 6.5 Sustainable cities 190 Integrated Sustainability Report - 2023 106 Areas of intervention PLANET AMBITION Climate change Circular economy Natural capital Sustainable cities Impacted SDGs Integrated Management System Transversal goal Increase investment in environmental protection by 50% by 2025. Objectives • Reduce Scope 1 and 2 GHG emissions by 42% and Scope 3 emissions by 25% by 2030. • Achieve carbon neutrality by 2050. • Increase waste reuse up to 80% by 2025. • Biodiversity objectives in 100% of new contracts. • Reduce own water consumption by 10% by 2025. • Promote sustainable infrastructure and advance towards low-emissions mobility. Lines of action Energy efficiency. Renewable energy. Sustainable mobility. Value chain. Compensation. Collaboration with the Value Chain. Responsible use of resources. Waste reduction and recovery. Activities aligned with circularity principles. Natural Capital Assessment. Actions to protect and conserve flora, fauna and habitats. Management of water resources. Cultural and archaeological heritage. Light and noise pollution. Sustainable urban development. Sustainable mobility. Efficient water and energy use. Energy and innovation in cities. 6.1 Our environmental commitment [2-23] [3-3] [SASB IF-EN-160a.2] At Sacyr, we play an active role when it comes to the environmental challenges we face as a society, so we are committed to fighting climate change, using natural resources responsibly, protecting biodiversity and water resources and building sustainable cities. With this purpose, we promote initiatives for the environmental preservation and safeguards that incorporate quality criteria and are suited to both current needs and those of future generations, with special care for relations with our employees, supply chain, customers and other stakeholders. This premise is enshrined in the Code of Ethics and Conduct and in the Sustainability Policy Framework. With the aim of establishing principles and commitments to govern our environmental actions, we have a number of policies in place: • Quality, Environment and Energy Management Policy. • Climate Change Policy. • Water Policy. • Biodiversity Policy. • Circular Economy Policy. • Supply Chain Management Policy. All policies are first approved by the Board of Directors. The company's environmental sustainability strategy is developed in the 2021-2025 Sacyr Sustainable Action Plan, as part of the "Planet Ambition" pillar. Within the framework of this Ambition, we work in four areas of intervention: climate change, circular economy, natural capital and sustainable cities. Each of them impacts on one or more Sustainable Development Goals and pursue strategic objectives for the company, by means of different action lines. 6 Planet ambition 107 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices To lay the groundwork for achieving our goals, we have an Integrated Management System that aligns our environmental strategy

with the Group's sustainability model. By implementing this system, we ensure the establishment of goals, our customers' satisfaction, legislation identification and compliance, the implementation of prevention and impact minimization measures and the availability of the necessary resources for comprehensive operational control in connection with the environment. This System is tailored to each work center, based on its activity, by means of a Management Plan. The performance of the indicators included in this chapter is influenced by the change in our organizational perimeter with respect to 2022 and by the construction business itself. This year we have carried out 70,676 internal controls, 224 audits by accredited certifiers and 67 customer audits. These assessments determine our compliance with the System and enable us to propose recommendations and actions for improvement. In turn, the precautionary principle set out in our Quality, Environment and Energy Management Policy is applied through the System. The Quality, Environment and Energy Department, made up of an international team of 659 people, combining talent, experience and rigor, is tasked with guaranteeing compliance with the environmental goals, ensuring project quality and anticipating future risks. To bolster the integration of the environmental dimension and the application of the policies, we have the Sustainability and Corporate Governance Committee, delegated to the Board of Directors, and the Sustainability Committee, which are the most senior bodies responsible for sustainability matters. Given the importance of matters relating to environmental sustainability, we link cash and in-kind annual incentives to strategic objectives at every level of the organization. Environmental risk management is considered at the highest level, being regularly monitored and continuously reported to senior management. Within the framework of our Integrated Management System, we identify risks opportunities, analyze which threats may affect the achievement of the objectives established, and implement action plans for their removal, mitigation or control. With regard to opportunities, we address those that can generate a positive impact on both the company and society. In this chapter we outline the risk analysis for each area of intervention: climate change, circular economy, natural capital (biodiversity and water resources). At Sacyr we have various projects that comply with the Equator Principles (EP) and the performance standards of the International Finance Corporation (IFC) The Equator Principles (EP) are a set of standards adopted by some financial institutions to identify, assess and manage social and environmental risks. In Colombia, all our P3 projects are aligned with the Equator Principles and IFC Performance Standards, and in Peru the Jorge Chávez International Airport Expansion project is aligned with the Equator Principles. We work with financial institutions to obtain the best financial, environmental and social results. Integrated Sustainability Report - 2023 108 Member of the Climate Change Cluster Supporter of TCFD Member of the SBTi Companies taking action group Participant in the UN Global Compact Climate Ambition Accelerator for 1.5°C Participant in the United Nations Race to Zero campaign Member of the #PorelClima Community Member of various committees (Environment, Quality, etc.) Member of Nature Business Ambition Member of the Advisory Committee for certification of construction companies Member of the BREEAM Certification Advisory Board Partner of the Colombian Army in conducting reforestation initiatives Signatory of the MITERD Biodiversity Agreement Participant in the Madrid Green Urban Mobility Lab Signatory of the Compromisos d'acció climàtica of the Catalan Climate Action Summit Member of Sustainable Cities 2030 Member of the Asphalts Committee of Chile, developing new technologies to fight Climate Change Member of the Innovation, Environment and Infrastructure committees of the Spanish Chamber of Commerce Member of the Spanish Chamber of Commerce (Peru) Signatory of the MITERD Circular Economy Pact Aligned with the Natural Capital Factory initiative Member of the EU Business & Biodiversity platform Member of the Spanish Green Growth Group (GECV) Member of Asociación Española para la Calidad Agreements with Parques Nacionales Naturales (Colombia) Agreement with Universidad de

Nariño (Colombia) Member of the Asociación para el Fomento de la Infraestructura Nacional in Peru Member of the Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM) Member of the Concrete Construction Innovation Group at Pontificia Universidad Católica de Chile

6.1.1 Strategic partnerships [2-28]

To build a greener and more responsible future, it is crucial to form partnerships to overcome all the barriers and increase our capacity for regenerative transformation. In the last few years, we have forged solid ties with universities, public administrations, intergovernmental bodies, NGOs and other companies, that share our vision focusing on people and the planet.

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6.1.2 Certifications [3-3]

Our Integrated Management System, implemented across all our business areas, allows us to establish a standardized and common framework comprising the certifications of each of the Group companies. At present, we have more than 212 certifications, in keeping with 28 of the most widely recognized international standards and validated by accredited benchmark certifiers. In 2023 we continued to work to increase our certifications. Below is a breakdown of the main standards for which we obtained certification in the year, and Appendix II expands on those certifications. However, our goal is to increase the percentage of our turnover that is certified to quality and environmental standards every year. 100% of the most significant activities are certified to ISO 9001 and ISO 14001 standards. In addition, we have been a licensee of the Madrid Excelente quality badge since 2003, in recognition of our commitment to excellence.

Information security	Quality	Environment	Energy	Product certification
41%	5%	3%	9%	42%

At present, 83.40% of the company's activities are certified to Quality (ISO 9001) and Environmental (ISO 14001) standards, audited by accredited certifying entities. 5.87% are verified by specialist third parties and 10.73% are verified by means of internal audits.

Certified activities (%)	2021	2022	2023
ISO 9001	80.75%	80.35%	82.17%
ISO 14001	82.04%	83.40%	83.40%

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- 110 Trams to Newhaven, winner of the Scottish Civil Engineering Awards

This project, developed by the SFN (Sacyr-Farrans-Neopul) joint venture, received an award in the Transport category. These awards are widely considered to be the recognition of construction engineering excellence in Scotland. They are a showcase for innovation and celebrate the vital contribution of civil engineers to our quality of life.

Deliquo Condesa obtained Sustainable Dining Certification Our Deliquo Condesa canteen at Sacyr's headquarters obtained AENOR Sustainable Dining certification for the first time. This certification includes our commitment to fight food waste and promote environmental sustainability. We renewed our forest biomass certification Sacyr Industrial, Operation and Maintenance renewed, for a further year, the PEFC (Programme for the Endorsement of Forest Certification Council) and FSC (Forest Stewardship Council) certifications for the chain of custody of forest products and forest biomass used at the power plants operated by the Group. Furthermore, we are also actively participating in the certification process through the voluntary Sure System scheme, endorsed by the EU for compliance with the Renewable Energy Directive (RED II).

Product labels [417-1]

Our proprietary lighting system Sacyr IOHNIC complies with legislation and labeling requirements in force. IOHNIC has the required markings, ensuring through inspection and testing that the labeling remains clear and visible. They include information on brand, model, manufacturer's and importer's address, voltage, frequency and power of the equipment, EC marking, classification of the lighting according to its type of surge protection, penetration of dust, solid bodies and humidity, special conservation and usage conditions, if applicable, etc. All additional information is in the product manuals, which provide users with details for safely using the equipment from assembly to proper disposal at the end of its useful life. Furthermore, our lighting

has obtained prestigious certification such as ENEC, a certification applicable to electric and electronic products, that is consistent with other global certifications and guarantees, among other things, compliance with requirements on product information and labeling in any market. Trams to Newhaven. Scotland 111 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.1.3 Environmental and regulatory compliance spending and investment 6.1.3.1 Environmental spending and investments [3-3] [201-2] In 2023, we continued to invest in caring for the environment, fostering initiatives focused on measuring our impact on natural capital in the projects we develop, safeguarding biodiversity and preventing pollution, improving waste management, and adopting energy saving and efficiency measures, as well as providing training to continue disseminating the importance of protecting the natural environment. Environmental spending and investments amounted to more than €58 million in 2023. We ramped up our environmental spending and investments by 10.38% in 2023 compared to 2022, in line with the commitment in our 2021-2025 Strategic Plan to increase investment to protect the environment by 50%. In the last 3 years, we have invested more than €158 million in environmental protection. 2021 2022 2023 €15,623,957.29 €31,130,892.53 Costs of waste treatment, emissions treatment and restoration Environmental management and prevention costs €18,384,956.84 €34,522,557.373 €14,204,791.14 €44,194,421.10 +37% compared to 2020 +13% compared to 2021 +10% compared to 2022 Integrated Sustainability Report - 2023 112 Environmental spending and investment includes the costs associated with each of the measures implemented to manage climate change risks and opportunities. At Sacyr, we believe that innovation and environmental sustainability must go hand in hand. The company's innovation goals are based on the quest for efficiency and the development of new business models, through an unwavering effort to identify solutions to the main environmental challenges, among others. Sacyr has invested more than €4,138,000 in innovation projects related to the environment. Circular economy innovation Innovation in sustainable mobility Water innovation Innovation in sustainable construction Climate innovation 6.1.3.2 Regulatory compliance [2-27] [3-3] [SASB IF-EN-160a.1] Compliance with all environmental regulations is an embedded priority in all our activities and all the countries where we operate. Accordingly, we continuously monitor environmental law and regulations to ascertain their effect on our activities and take the necessary action to respond to new requirements, and to oversee their compliance through mandatory environmental audits. In 2023, 8 proposed penalties were received in connection with possible environmental non-compliances and 8 environmental proceedings were closed, 5 opened this year and 3 in 2022. Of these, 3 were closed without liability and at no cost, and 5 were filed at a cost, the total amount paid for all of them amounting to €21,122.27. Penalty proposals received 6 6 8 Total amount of penalties closed €9,540 €0 €21,122.27 Proceedings closed 4 0 8 Proceedings closed at no monetary cost 0 0 3 2021 2022 2023 In 2023, Sacyr renewed its international Corporate Environmental Liability Insurance Program, which covers all the Group's units. This policy sufficiently complies with the qualitative and quantitative requirements contained in the prevailing regulations in each country (e.g. Law 26/2007 in the case of Spain We invested €58 million in environmental protection and conservation, a 70% increase with respect to 2020. +€819,500 +€1,172,500 +€950,530 +€819,006 +€376,465 113 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices and Decree-Law 147/2008 in the case of Portugal). Indemnity in the Insurance Program is capped at €40 million per claim and €75 million for the duration of the policy. The corporate program is supplemented by local policies arranged for the projects according to the contractual and/or legal requirements that apply to them. The

premium cost of these policies amounted to €365,000 in 2023.

6.1.4 Environmental awareness

Given the current environmental crisis, raising awareness in society at large is crucial for adopting measures to help mitigate the effects our activities can have. Thus, we equip the stakeholders with whom we interact (company personnel, collaborators, local communities, etc.) with the tools to make informed decisions and adopt responsible measures. We need everyone on board to achieve our environmental goals. In 2023 we carried out 4,865 training actions in various spheres such as natural capital and energy management. We also provided environmental training to all staff involved in our projects (efficient use of resources, biodiversity care, waste prevention and management techniques, and so on) by delivering and explaining to them the Best Environmental Practices Handbook. Further enhancing our environmental commitment, this year we provided various training exercises for structural personnel. This training, linked to the environmental area of the 2021-2025 Sacyr Sustainable Action Plan, was provided to Sacyr employees via our internal training platform Explora.

Year	In-house personnel	External personnel*	Local communities	TOTAL
2021	43,595	24,101	13,370	81,066
2022	77,719	71,967	49,745	199,431
2023	49,745	835	1,907	51,487

* External personnel includes sub-contractors, suppliers and collaborators.

[404-1] > Environmental training hours to in-house personnel by gender

Year	Men	Women	TOTAL
2021	39,323	19,946	59,269
2022	10,437	4,272	14,709
2023	4,155	2,933	7,088

[404-1] > Environmental training hours to in-house personnel by category

Year	Directors and management	Technical staff	Support staff	TOTAL
2021	709	433	1,056	2,198
2022	4,070	3,643	4,264	11,977
2023	38,816	20,025	8,050	66,891

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In addition to our training actions, we communicate with our employees through different channels to keep them abreast of our new environmental projects and initiatives. We also make available tools to continue to receive environmental training and stay informed of new regulations and market trends. We communicate market trends, news, regulatory developments and recommended books, documentaries or movies about the environmental challenges we face, and habits to reduce environmental impact in our daily lives.

Newsletter Sacyr for the Environment Podcast News on our Intranet We give updates on market trends, news, regulatory updates, and recommendations for books, documentaries, or films about environmental challenges, as well as habits to reduce environmental impact in daily life. On the Explora internal training platform, in-house experts discuss SBTi, the water footprint, sustainable certifications or natural capital.

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We share our environmental commitment through the "Sustainable Adventure" We internally launched the course "Sustainable Adventure" on Explora where we present all our management and commitment to sustainability in the countries where we operate and in the different businesses we carry out. Module 3 of this training itinerary is entirely dedicated to addressing "Our environmental commitment", including all the information related to our areas of intervention: Climate Change, Circular Economy, Natural Capital and Sustainable Cities. We celebrated World Environment Day We used this occasion to raise awareness inside and outside of the company on the importance of protecting the planet.

- At the headquarters of Sacyr Chile and Sacyr in Spain, under the slogan "Sow your idea and let your plant grow", aromatic plants were given out in return for employees leaving their ideas about how Sacyr can keep improving the environment.
- In Peru, as part of the "Reusing with Sacyr Peru" program, employees received seed kits and had a chance to acquire refurbished computers, giving them a second life.
- In Paraguay the "Swap your plastic bottles for a seedling" campaign invited all participants to swap their plastic bottles for a native tree seedling. We launched a mini-tutorial on Natural Capital In our internal training tool, Explora, we post training on

Natural Capital that includes a 10-minute explanation of what natural capital is, how it is different from biodiversity, why it is important to value it and what we are doing at Sacyr to address the challenges we face in connection with nature. Check out the video we launched on World Environment Day! Integrated Sustainability Report - 2023 116 6.2 Climate change As part of our Strategy, we set significant goals, we aim to mitigate the effects of climate change linked to our operation, we disclose information transparently, we raise our stakeholders' awareness and we adapt, robustly managing our risks in keeping with the best available practices. We are a TCFD Supporter, and trust in the recommendations issued by this framework to increase transparency on climate risks and opportunities in financial markets. The information disclosed in this section is structured in accordance with similar guidelines to those defined by TCFD, in compliance with the "Draft Royal Decree regulating the contents of reports estimating the financial impact of risks linked to climate change for financial institutions, listed companies and other large corporations", which in turn is aligned with the mandate provided in article 32 of Climate Change and Energy Transition Law 7/2021. There follows a detailed explanation of how we approach climate change with respect to: Governance Strategy Risk management Metrics and objectives [3-3] Climate change is a challenge for sustainable development that knows no borders, and fighting it requires the concerted efforts of all public institutions and bodies as well as the private sector. At Sacyr, we responsibly manage the environmental impacts of our activities, addressing them with a preventive approach. Likewise, we work to offer solutions that tackle that challenge, focusing on decarbonization and adaptation as the basic axes of our Climate Change Strategy to be carbon neutral by 2050. Our efforts and commitment to reduce and adapt to the effects of climate change make us industry leaders in this connection, as evidenced by our inclusion in prestigious indices (for more information, see section 4.3 ESG ratings and indices. Included in the CDP's "A" List as a global leader against climate change For the fifth year in a row, we took part in the Carbon Disclosure Project (CDP), publicly disclosing information about what we do and how we perform in connection with climate change. For the second consecutive year, we have achieved the highest possible rating, being one of a small group of companies worldwide that have obtained an "A" score, from among the more than 21,000 companies rated. This organization considers different aspects when awarding the rating, including the roles and responsibilities of the company's bodies in the supervision of climate-related issues; risks and opportunities associated with climate change; carbon footprint calculation; definition of emission reduction targets and plans; and adherence to initiatives aimed at promoting sustainable development. A LIST 2023 CLIMATE WATER 117 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices SUSTAINABILITY AND CORPORATE GOVERNANCE COMMITTEE • Ensures compliance with climate policies and goals. • Is a delegated and consultative body of the Board of Directors. • Meets quarterly. CORPORATE OPERATIONS DEPARTMENT • Manages mitigation and adaptation actions, channeling climate-related topics from the Management Committee to the Sustainability Committee. SUSTAINABILITY COMMITTEE • Develops and executes the policies. • Supervises and assesses stakeholder relation processes. • Drafts reports for Senior Management: on the progress of the Strategic Plan and the climate goals included therein. • Meets quarterly. QUALITY, ENVIRONMENT AND ENERGY DEPARTMENT • Identifies climate risks and opportunities. • Supervises the implementation of plans and fulfillment of goals in all areas and geographies. • Oversees the Climate Change Strategy and the level of compliance with its goals. RISK CONTROL AND MANAGEMENT DEPARTMENT • Coordinates with business areas the oversight and reporting of the risk analysis to support key decisions. BUSINESS DIVISIONS AND UNITS • Provide information to identify and assess risks and opportunities. • Implement measures to fight climate change.

MANAGEMENT COMMITTEE • Comprises the executive bodies and management team. • Meets monthly.

BOARD OF DIRECTORS • Approves the Climate Change Policy. • Meets at least eight times a year.

6.2.1 Governance The Board of Directors of Sacyr, within the scope of its powers to determine the Group's policies and strategies, approved our Climate Change Policy, which defines and establishes the principles and criteria governing our actions. Furthermore, this body tops the governance structure relating to the identification, assessment and management of transition and physical risks, as well as the opportunities linked to climate, overseeing Sacyr's performance in this 1 For more information, see the 2023 Directors' Remuneration Report. matter. We also have a target-based management program that involves setting and monitoring specific targets. The incentive to the executive director is linked to achievements such as reducing emissions, among others1 . We have a solid structure for the assessment and monitoring of our Climate Change Strategy by means of the oversight of various governance bodies: Integrated Sustainability Report - 2023 118

6.2.2 Management of risks and opportunities We have procedures, integrated into our organization's global risk management system, to identify and manage climate-related risks and opportunities. In them we establish the assessment criteria and protocols which enable us to identify which might have a material impact in each of the horizons defined in our Climate Change Strategy, in accordance with the TCFD recommendations, the EU Taxonomy (Commission Delegated Regulation 2021/2139) and the "Draft Royal Decree regulating the contents of reports estimating the financial impact of risks linked to climate change for financial institutions, listed companies and other large corporations". The results of this analysis are reviewed with the heads of the business units to gauge their importance by activity and location. Finally, we prioritize risks and opportunities annually, estimating their financial impact in different scenarios and in keeping with our Strategy and the useful life of assets and infrastructure. We consider various physical climate scenarios, included in the 6th report by the Intergovernmental Panel on Climate Change (IPCC) and various transitional climate scenarios, taking into account the scenarios outlined by the International Energy Agency in its latest World Energy Outlook (WEO) report.

6.2.2.1 Transition risks and opportunities [201-2] Mindful that the economic model is in the midst of a transition towards a decarbonized economy, at Sacyr we tackle the global challenges posed by the current environment as an active part of the solution. In accordance with the Draft Royal Decree regulating the contents of reports estimating the financial impact of risks linked to climate change, our starting point are the concepts of transition risks and opportunities included in its Annex 2 which, in turn, takes as a reference the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). To assess these risks and opportunities, we used the annual IEA analysis which is based on the latest energy data and market trends. This is based on the key dataset from the Global Energy and Climate Model (GEC Model) included in the latest edition of the annual World Energy Outlook report. This model allows us to examine different scenarios, each based on different assumptions on how the energy system might respond to the current global energy crisis and evolve from it. By comparing these scenarios, we can determine which factors influence the various results and understanding the opportunities and challenges that might emerge in the time frames established in our Climate Change Strategy. The scenarios include:

- Stated Policies Scenario (STEPS). A scenario that reflects the current political configuration based on a sector-by-sector and country-by-country evaluation of the specific policies in place, as well as those that have been announced by governments around the world.
- Announced Pledges Scenario (APS). A scenario that implies that all the climate commitments undertaken by governments around the world, including the Nationally Determined Contributions (NDCs) and the long-term net zero and other objectives, will be achieved in full and on time.
- Net Zero Emissions by 2050 Scenario (NZE). A scenario that establishes a path for the global energy sector to achieve net zero

emissions of CO₂ by 2050. Carbon pricing Carbon pricing is an instrument that we use to consider the greenhouse gas emissions generated in our projects and decisions for the various transition scenarios. This tool allows us to stay ahead of regulations, exceed the expectations of our stakeholders and foster investment in sustainable activities and energy efficiency in our organization. We calculate an internal carbon price for each project, region or procurement of different energy sources. 119 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

At Sacyr, we use two methods, Shadow Carbon Pricing and Implicit Carbon Pricing, to calculate our Internal Carbon Price. This internal mechanism is essential to our decisions, especially in the choice of renewable energy sources, since it includes the cost of carbon emissions in our assessments, allowing us to analyze the economic feasibility and the environmental impact of our energy options. Shadow Carbon Pricing is calculated by analyzing the price of voluntary carbon markets, location, sectors, the evaluation of the expenses incurred to avoid unwanted environmental impacts or jeopardizing revenues. This method allows us to foresee future risks and regulations, improving decision making and strengthening our commitment to sustainability. It is considered an additional cost when it comes to selecting projects, managing risks, proposing offers, Shadow Carbon Pricing (€/t CO₂ eq) Stated Policies 119.21 160.74 Announced Pledges 127.81 181.29 Net Zero Emissions by 2050 129.06 193.79 2030 2050 etc. Our current average price is €98.24/t CO₂ eq and, considering the various scenarios we have already described, we have different shadow prices we can apply to our analysis of risks and opportunities: 6.2.2.2 Physical risks

Following the EU Taxonomy and focusing on physical climate risks, we have implemented for the second consecutive year a procedure in compliance with Commission Delegated Regulation (EU) 2021/2139. This procedure and its results are incorporated into Sacyr's Climate Change Adaptation Plan, designed in accordance with the criteria of substantial Compliance with substantial contribution and DNSH to climate change adaptation criteria contribution to climate change adaptation and do no significant harm (DNSH). We annually assess the physical climate risks listed in these regulations that may affect our operations over their lifetime, and implement adaptation solutions if material risks are found after assessing each asset's vulnerability. The Implicit Carbon Pricing method is calculated based on the costs associated with our emissions reduction targets, including the purchase of renewable energy and energy efficiency improvements. According to our latest research, this price is €16.68/t CO₂ eq. Engineering and Infrastructure P3 Holding Map of rising temperatures Integrated Sustainability Report - 2023 120

MITIGATION Decarbonization Plan METRICS AND OBJECTIVES This assessment is carried out in accordance with the various key variables, extreme indices and climate impact drivers provided by the IPCC, according to its Sixth Assessment Report, based on the location of each of Sacyr's assets worldwide. Our analysis was based on 34 different models for shared socioeconomic pathways (SSPs), using the highest resolution and most advanced climate projections available in the existing range of future scenarios compatible with each asset's estimated lifetime. The scenarios used were SSP1-2.6, SSP2-4.5 and SSP5-8.5, from the Coupled Model Intercomparison Project Phase 6 (CMIP6) database.

- SSP1-2.6. Global emissions are severely reduced, reaching net zero but after 2050. The temperature increase will be 1.8°C by the end of the century.
- SSP2-4.5. Emissions are around current levels before falling mid-century, but do not reach net zero by 2100. Temperatures will increase by 2.7°C by the end of the century.
- SSP5-8.5. Current emissions levels will double, approximately, by 2050. By 2100, the average global temperature will be 4.4°C higher.

In our climate risk and vulnerability assessment process, we consider a risk to be significant or material when an asset's vulnerability is significant or critical, taking into account its exposure, level of risk and adaptive capacity. If we identify a risk as being significant or material, we conduct an assessment

of adaptation solutions to mitigate that physical climate risk. 6.2.3 Strategy Our Climate Change Policy evidences our active contribution to building a sustainable future, minimizing the environmental impact of all our activities. The policy addresses topics such as climate change mitigation and adaptation, energy efficiency, the rollout of renewable energy and other related aspects. Consequently, this Policy defines and establishes the criteria governing our Climate Change Strategy. With the aim of mitigating the impact from our operations and adapting to the effects of climate change, our Strategy sets short-, medium- and longterm emissions reduction targets and we analyze the physical and transition risks and opportunities, defining measures to manage them. To achieve our goals and anticipate a range of scenarios and horizons, we have a Decarbonization Plan and an Adaptation Plan as part of our Climate Change Strategy. These plans include multiple lines of action and specific projects, as well as key performance indicators (KPIs) to gauge our progress. Jorge Chávez International Airport. Peru CLIMATE CHANGE POLICY The principles guiding our actions. ADAPTATION Adaptation Plan CLIMATE CHANGE STRATEGY Measure our performance, mitigate our impacts and maximize our resilience. 121 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Climate change strategy Medium term (Science Based Target initiative) Long term (Strategic Plan Goal) 2030 2050 Short term (Sacyr Sustainable Action Plan) -25% Scopes 1 and 2 (baseline year 2016) Acute: Heavy rainfall, flooding, landslides and subsidence. Reputational: Public concern or adverse opinion. Products and services: Development of new products and services through R&D. -42% Scopes 1 and 2; -25% Scope 3 (baseline year 2020) Carbon neutrality 2025 Mitigation Adaptation Technological: Costs derived from the transition to loweremission technologies. Markets: Access to new assets and markets. Energy sources: Use of lowemission energy sources and utilization of decentralized energy generation. Acute: Drought. Markets: Increased cost of raw materials. Products and services: Development of climate adaptation solutions. Physical risks Transition risks Opportunities 6.2.3.1 Mitigation [302-4] [302-5] [305-5] To keep to our path of compliance with the 2025 goal and set new intermediate targets for achieving neutrality by 2050, we have ramped up our ambition, approving a new medium-term objective based on the Science Based Target initiative (SBTi), which provides companies with a roadmap to reduce emissions. Our Climate Change Strategy includes our commitment to reduce our absolute Scope 1 and 2 GHG emissions by 42% and Scope 3 GHG emissions by 25% by 2030 with the goal of achieving carbon neutrality by 2050. These goals are consistent with limiting the increase in the global temperature to 1.5°C. Science Based Targets initiative These targets are considered to be "science-based" as they are in line with what the latest climate science considers to be necessary for meeting the Paris Agreement goals: to limit global warming to 1.5°C above preindustrial levels. Integrated Sustainability Report - 2023 122 > SBTi Scopes 1+2 > SBTi Scope 3 Scope 1+2 Scope 3 2023 2030 Target 42% 2023 Target 13% Baseline year 2020 2023 Results 15% 2023 2030 Target 25% 2023 Target 8% Baseline year 2020 2023 Results 57% The Scope 3 SBTi target includes the categories of goods and services acquired, fuel- and energy-related activities, waste generated in operations and investments. In 2023 we ratified compliance with the roadmap drawn to achieve these goals. These results have been possible thanks to our Decarbonization Plan, which comprises around 100 projects carried out by Sacyr's various business units in all the locations where we are present. These projects are coordinated through various working groups, made up of specialists representing the different Sacyr Group companies. All the projects belong to one of the four broad areas of action identified in our Climate Change Strategy: energy efficiency, renewable energy, sustainable mobility and the rest of the value chain. Las Setas de Sevilla. Spain 123 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest

level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

In 2023 we implemented energy efficiency improvements at our facilities and our customers' facilities, offering specially tailored advice. We also renewed ISO 50001 certification for all our operations. This year, Sacyr achieved energy savings of 6,475.98 GJ (11,920.67 GJ in 2022), thus avoiding the emission of 270.97 t CO₂ eq into the atmosphere (835.70 t CO₂ eq in 2022). These savings are the result of measures implemented last year in connection with lighting, renewable electricity generation and vehicle renewal, evolving towards a more efficient fleet. Furthermore, we helped reduce energy by 1,999.00 GJ (2,510.78 GJ in 2022) through the provision of services to customers, avoiding the emission of 222.48 t CO₂ eq (130.09 t CO₂ eq in 2022). Our commitment to renewable energy, due to its impact on reducing direct and indirect emissions, is one of the foremost principles of our Climate Change Policy. We continue to promote the use of renewable energy in all the countries where we operate, boosting the proportion of renewables over the total energy consumed by Sacyr to 22% (27% in 2022). Specifically, 32% (39% in 2022) of our electricity consumption was from renewable sources. Our main initiative in this area is to consume electricity with a guarantee of origin certificate in projects located in Spain where 37% of the electricity we consume has this accreditation (53% in 2022). 20,527.39 MWh in energy savings +90,348.74 MWh of renewable energy consumption +200,267.69 MWh of renewable electricity consumption 62,709.87 t CO₂ eq in Scope 1 and 2 emissions reduced

DECARBONIZATION PLAN

Energy efficiency Energy management is crucial for our sustainable development. We foster practices that reduce the use of energy resources, minimizing the environmental impact without compromising our performance. Renewable energy We promote the transition to renewable energy as key for decarbonizing the economy. We foster its use in our operations and we develop infrastructure to generate energy from sources such as wind, solar, biomass and geothermal. We obtained ISO 50001 certification for desalination plants for the first time internationally By implementing this international standard at our desalination plants in Algeria and Oman we ensure they have energy saving measures in place, thereby reducing their specific consumption. This standard emphasizes the need to work on continuous improvement as a key factor in the energy management system, and this improvement is most closely linked to information deriving from the analysis and evaluation of the system. We installed a total of 929 solar panels along the Rota de Santa María highway (Brazil) These panels will generate 690,000 kWh/year of energy, enough to supply 100% of consumption of the toll booths and public lighting.

VS. 2020 VS. 2020 VS. 2020 VS. 2020

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124 Sustainable mobility We are committed to low-emissions urban mobility that is safe and accessible and that harnesses innovation and technology to drive the transformation. Value chain We reduce indirect emissions derived from our value chain by analyzing and implementing initiatives, from the procurement of goods and services stage to the waste generated in contracts. We are committed to transitioning to a more efficient fleet as part of the urban mobility transformation. We use various initiatives to reduce emissions, foster energy efficiency and enhance quality of life in the areas where we operate. Raising awareness among our stakeholders, from employees to suppliers, customers and citizens, as well as investing in innovation and technology, are pivotal steps to achieving a fleet of hybrid and electric vehicles. For more details on these initiatives, see section 6.5.3 Sustainable Mobility. To reduce emissions associated with the entire value chain, we have integrated a company-wide approach that seeks to influence the entire life cycle of the different activities we carry out, from product manufacturing, waste management and recovery, to the implementation of initiatives to reduce emissions associated with employee travel. 32,117.20 t CO₂ eq of Scope 1 emissions reduced 2.03M t CO₂eq of Scope 3 emissions reduced 269 electric chargers installed 198,459 t CO₂eq of waste management reduced We promote carpooling at our headquarters From July to September, at our

Condesa de Venadito headquarters we launched a pilot project with the Ciclogreen app to encourage employees to carpool on their journeys to the office. We provide more details on our initiatives to promote sustainable mobility in section 6.5.3, which focuses on that topic. We are progressing in our decarbonization throughout the supply chain We conducted a pilot initiative using the CAM (Carbon Action Module) tool developed by Ecovadis, identifying the risks and opportunities, assessing the performance and monitoring the environmental impact of our main suppliers in the engineering and Infrastructure business. VS. 2020 VS. 2020 VS. 2020 VS. 2020 125 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Forest replanting in Villanueva de Abajo (Spain) This project is aimed at effectively combating climate change, specifically by a reforestation initiative conducted in an environmentally friendly way that will allow the regeneration of degraded or natural spaces that have lost their tree cover. Moreover, it reduces erosion, helps preserve biodiversity and creates jobs in the community. This project is certified by the Ministry for the Ecological Transition and the Demographic Challenge. Cururos wind farm (Chile) The Cururos wind farm project includes two wind farms, called “El Pacifico” and “La Cebada” with a total installed capacity of 109.6 MW and an average generation of 290 GWh per year. The wind farm is connected to the Central Interconnected Grid (SIC). By replacing fossil fuel-based energy in the network, it has the capacity to reduce greenhouse gas emissions. The project will also contribute to the sustainable development of the grid, country and region by reducing reliance on finite, nonrenewable resources, generating job opportunities, advancing the transition to clean technology and creating new source of direct and indirect income. This project is backed by Gold Standard certification. Offsetting Through the voluntary carbon credit market, we support local projects that not only offset our carbon footprint, but also generate green jobs and benefit the communities we interact with in our projects. This year we offset a total of 1,600 tons of CO₂ eq linked to our executives’ travel through the following projects: For the second consecutive year, the Spanish Climate Change Office (OECC) awarded us the triple “Calculo-Reduzco-Compenso 2022” badge. This recognition is received by the organizations that calculate and register their carbon footprint for at least four years, have a plan to reduce their emissions, act on their commitment to reduce emissions and take part in a carbon capture project. We have registered our carbon footprint of our activities in Spain. Department of Agriculture, Livestock, Fisheries and Sustainable Development of the Andalusian Regional Government, through SACE. We belong to the Catalonia Program for Voluntary Agreements, a tool promoted by the Catalan Office of Climate Change (OCCC), fulfilling one of the commitments acquired in 2020 through our adherence to Catalonia’s climate action pledges within the framework of the Catalan Climate Action Summit. We have strengthened our local commitment in the regions where we operate, registering our carbon footprint in regional registries. Integrated Sustainability Report - 2023 126 6.2.3.2 Adaptation [201-2] Since publication of the TCFD recommendations, we have been analyzing climate-related risks and opportunities and how we can adapt to them. As detailed above, at Sacyr we have been phasing in the various regulatory requirements related to this analysis, identifying the risks and opportunities we must focus on as a result of our materiality analyses. In keeping with the recommendations and regulations provided in section 6.2.2 Management of risks and opportunities, climate-related risks may be the consequence of physical effects caused by climate change or of the transition towards a low-carbon economy with the capacity for adaptation and recovery with respect to climate change. Physical hazards may be acute, if they are a consequence of one-off events, or chronic, if they are a consequence of longer-term changes in climate. Meanwhile, transition risks include legal and policy, technology, market and reputational risks. Finally, climate-related opportunities refer to potential

positive effects linked to climate change as a consequence of mitigation or adaptation efforts by Sacyr and society at large. These may relate to resource efficiency, energy sources, products and services, markets or capacity for adaptation. We have developed and established a methodology to assess risks, vulnerabilities and opportunities based on their probability, impact and our capacity for adaptation, which allows us to estimate the actual and potential financial impacts that may be meaningful for the business and that we see as a Time frame Risks/Opportunities Business Countries Scenario 2025 Acute: Heavy rainfall, flooding, landslides and subsidence. Sacyr Concesiones, Engineering and Infrastructure (Transportation). Colombia, Paraguay, Uruguay. SSP1-2.6 Reputational: Public concern or adverse opinion. All Sacyr businesses. All the countries where we operate. STEPS Products and services: Development of new products and services through R&D. All Sacyr businesses. All the countries where we operate. NZE 127 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Description KPI Management

The occurrence of extreme weather events unleashing torrential rains can cause landslides that increase the costs of implementing projects linked to the repair, protection and prevention of damage. • Financial impact Internal energy consumption (MWh) 1,047,791.02 1,130,348.12 1,224,816.63 1,027,465.58 2020 2021 2022 2023 Consumption in 2023 amounted to 3,698,876.09 GJ. Energy consumption from renewable sources amounted to 221,431.28 MWh (333,931.25 MWh in 2022). 6.2.4.1 Energy consumption Electricity* > Energy consumption by source (%) 65.60% 24.13% 6.28% 2.05% 0.89% 0.73% 0.18% 0.13% 0.01% 0.01% 0.004% 0.0002% * Renewable electricity accounted for 20.66% of total energy consumed. Purchased renewable electricity consumed was 20.39% and produced renewable electricity consumed was 0.27%, equivalent to 2,739.38 MWh. Tremezzina bypass. Italy Diesel A (automotive) Diesel B (agricultural and fishing) Diesel C (heating) Biodiesel Butane Propane Fuel oil Liquefied Petroleum Gas Natural Gas Compressed Natural Gas Gasoline

131 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Energy consumption outside the organization comes from business travel, as well as from external activities carried out by the company. [302-2] > External energy consumption (MWh) 17,325.45 17,280.87 26,800.48 37,472.96 2020 2021 2022 2023 Consumption in 2023 amounted to 134,902.65 GJ. Sacyr's energy intensity is as follows: [302-3] > Energy intensity (MWh/ €M) Total energy consumption (MWh)* 1,065,116.47 1,147,628.99 1,251,617.11 1,064,938.54 Turnover (€M)** 4,547.88 4,675.37 5,851.72 4,609.43 Energy intensity 234.20 245.46 213.89 231.03 2020 2021 2022 2023 * Total energy consumption includes that inside and outside of the organization. ** Revenues (€ M) are shown in note 28. For net revenues go to our financial statements. Consumption in 2023 amounted to 3,833,778.74 GJ. Honaine Desalination plant. Algeria 6.2.4.2 Greenhouse gas inventory [3-3] [305-5] For years, Sacyr has been calculating the greenhouse gas emissions generated by our activities. This measurement allows us to gauge our impact, detect the most emissions-intensive activities and establish mitigation measures in keeping with our objectives. We compile an annual inventory of our greenhouse gas emissions following the GHG Protocol methodology and submit it to an independent review in accordance with the ISAE 3410 standard "Assurance Engagements on greenhouse gas statements"2 . We have also renewed our greenhouse gas verifications under the latest version of the ISO 14064 international standard for Sacyr Engineering and Infrastructure and Sacyr Water, both in Spain. Scopes 1 and 2 Our Scope 1 emissions stem from the various operating centers and are associated with: • Fuel combustion from mobile sources: emissions from fuel consumption associated with travel and machinery. • Fuel combustion from fixed sources: emissions from fuel consumption associated with stationary or fixed equipment and fixed

facilities. • Leaks: emissions from leaks of cooling gases from air-conditioning equipment. Scope 2 emissions come from our various operating centers and are associated with the electricity consumption of these facilities. 2 The independent verification report of the greenhouse gas emissions inventory is included in Appendix IV. Reliability. Integrated Sustainability Report - 2023 132 We are among the European companies to have achieved the greatest reduction in emissions intensity, according to “Europe’s Climate Leaders 2023” compiled by the Financial Times and research firm Statista, where we rank top in our sector worldwide. [305-1] [305-2] [305-4] > Greenhouse gas emissions t CO2 eq (Scopes 1 y 2) Scope 1 emissions 119,657.23 119,083.68 120,038.06 87,540.03 Scope 2 emissions 290,433.97 274,570.05 253,441.16 259,841.30 Total 410,091.20 393,653.73 373,479.21 347,381.33 Revenues (€M)* 4,547.88 4,675.37 5,851.72 4,609.43 GHG intensity (t CO2 eq/€) 90.17 84.20 63.82 75.36 2020 2021 2022 2023 The main reason for the increase in Scope 2 emissions has been the increase in the emission factor of the electricity mix in Algeria and Oman. Scope 2 emissions are calculated under the market-based approach. Calculated under the location-based approach they would be 358,722.46 t CO2eq (472,737.89 t CO2eq in 2022). *Turnover (€ M) is available in note 28. For net revenues go to our financial statements. The evolution of our Scope 1 and 2 emissions indicates that we are on track to achieve the science-based target (SBTi) aligned with the 1.5°C scenario, reducing at least 4.2% of emissions annually from the base year. Thanks to the reduction initiatives detailed in section 6.2.3.1 Mitigation, we have already reduced emissions from Scope 1 and 2 by 15.29% compared to our baseline year 2020. Baseline year 2030 Target -42% 237,853 t CO2 eq Scope 3 Scope 3 emissions include the rest of indirect emissions. In order to ascertain and reduce the value chain's impact, we calculated all the Scope 3 categories included in the GHG Protocol, analyzing their importance in our activities. 133 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices EMPLOYEE COMMUTING Emissions associated with employee commuting. 20,563.31 t CO2 eq in 2020 33,312.39 t CO2 eq in 2021 56,891.92 t CO2 eq in 2022 32,560.78 t CO2 eq in 2023 UPSTREAM LEASED ASSETS Emissions associated with operations and maintenance at industrial plants. 212,457.77 t CO2 eq in 2020 209,726.50 t CO2 eq in 2021 121,250.65 t CO2 eq in 2022 183,231.80 t CO2 eq in 2023 DOWNSTREAM TRANSMISSION AND DISTRIBUTION Emissions associated with the transportation and distribution of RARx and IOHNIC. 92.23 t CO2 eq in 2020 207.47 t CO2 eq in 2021 281.68 t CO2 eq in 2022 67.38 t CO2 eq in 2023 USE OF PRODUCTS SOLD Emissions associated with the use of traded RARx and IOHNIC. 23.00 t CO2 eq in 2020 57.20 t CO2 eq in 2021 61.81 t CO2 eq in 2022 14,788.88 t CO2 eq in 2023 INVESTMENTS Issues associated with investee companies over which Sacyr does not have operational control. 1,690,204.72 t CO2 eq in 2020 888,700.84 t CO2 eq in 2021 11.47 t CO2 eq in 2022 1,627.89 t CO2 eq in 2023 *Due to the inclusion of emissions associated with the life cycle of our IOHNIC product in the calculation, for the first time we have calculated GHG emissions in the “Treatment of products sold at the end of their useful life” category, which in 2023 amounted to 0.69 t CO2 eq. Having analyzed the fifteen Scope 3 categories, the “Downstream leased assets” and “and “Franchises” categories are not considered as they are not material for the organization. This is because there are no emissions not included in Scopes 1 and 2 from the operation of assets owned by us and leased to other entities or from the operation of franchises. The “processing of products sold” category refers to emissions associated with post-sale transformations of products so requiring to achieve their operating purpose. IOHNIC is assembled and installed by third parties, whose emissions are already accounted for in the acquisition of goods and services category. Emissions from previous years in this category due to the processing of the RARx product amounted to 56.68 t CO2 eq in 2020, 140.98 t CO2 eq in 2021 and 152.35 t CO2 eq in 2022. GOODS AND SERVICES

ACQUIRED Emissions derived from purchased goods and services needed to execute the activities. 1,299,488.54 t CO2 eq in 2020 1,647,194.47 t CO2 eq in 2021 1,540,958.04 t CO2 eq in 2022 1,299,995.07 t CO2 eq in 2023 CAPITAL GOODS Emissions associated with the life cycle of capital goods purchased or acquired. 184,713.11 t CO2 eq in 2020 41,328.62 t CO2 eq in 2021 46,330.73 t CO2 eq in 2022 23,348.43 t CO2 eq in 2023 ACTIVITIES RELATING TO FUEL AND ELECTRICITY Emissions associated with fuel and electricity generation, transmission and distribution. 95,166.15 t CO2 eq in 2020 131,695.17 t CO2 eq in 2021 110,295.71 t CO2 eq in 2022 102,363.48 t CO2 eq in 2023 UPSTREAM TRANSMISSION AND DISTRIBUTION Emissions associated with transport and distribution services for acquired products, parcels and machinery. 608.86 t CO2 eq in 2020 439.77 t CO2 eq in 2021 38,273.42 t CO2 eq in 2022 6,061.83 t CO2 eq in 2023 WASTE GENERATED IN OPERATIONS Emissions associated with the management of all waste generated by business activities. 205,531.99 t CO2 eq in 2020 38,143.89 t CO2 eq in 2021 31,392.04 t CO2 eq in 2022 7,072.81 t CO2 eq in 2023 BUSINESS TRAVEL Emissions associated with employee travel and overnight stays for work purposes. 5,297.69 t CO2 eq in 2020 5,332.06 t CO2 eq in 2021 7,707.22 t CO2 eq in 2022 11,275.74 t CO2 eq in 2023

[305-3] Integrated Sustainability Report - 2023 134 Our Scope 3 emissions performance indicates that we are on the path of compliance with the science-based target (SBTi) aligned with the 1.5°C scenario, annually reducing emissions by at least 2.5% compared to the baseline: > Other indirect greenhouse gas emissions t CO2 eq (Scope 3) Total 3,714,204.05 2,996,279.37 1,953,607.03 1,682,394.79 SBTi 3,290,391.40 2,705,734.37 1,682,657.26 1,411,059.26 2020 2021 2022 2023 The Scope 3 SBTi target includes the categories of goods and services acquired, fuel- and energy-related activities, waste generated in operations and investments. Thanks to the reduction initiatives detailed in section 6.2.3.1 Mitigation, we have already reduced our total Scope 3 emissions by 55% and our SBTi-criteria Scope 3 emissions by 57% with respect to our baseline year 2020. Total emissions Our complete Greenhouse Gas Inventory includes all the emissions scopes. > Total greenhouse gas emissions t CO2 eq Scope 1 119,657.23 119,083.68 120,038.06 87,540.03 Scope 2 290,433.97 274,570.05 253,441.16 259,841.30 Scope 3 3,714,204.05 2,996,279.37 1,953,607.03 1,682,394.79 Total 4,124,295.25 3,389,933.10 2,327,086.25 2,029,776.12 2020 2021 2022 2023 Scope 2 emissions are calculated under the market-based approach. Calculated using the location-based approach, total emissions (Scopes 1, 2 and 3) would amount to 2,128,657.28 t CO2 eq (2,546,382.98 t CO2 eq in 2022). Emissions avoided In accordance with our Climate Change Strategy, we continue our endeavors to avoid emissions by designing activities that prevent them, both in our operations and at the various stages of our value chain. > Emissions avoided (t CO2 eq) Renewable energy consumption 95,281.76 160,421.12 99,685.78 Integrated water cycle 16,123.05 23,945.74 23,805.66 Reuse of works materials 6,575.77 6,662.37 1,485.76 Total 117,980.58 191,029.23 124,977.20 2021 2022 2023 By contracting and generating renewable electricity for self-consumption, we have avoided 355,388.66 t CO2eq compared to our baseline year 2020. Furthermore, at Sacyr Water, which owns the integrated water cycle plants, we capture the biogas generated, thereby avoiding the direct emission of methane into the atmosphere, and we use it to produce renewable energy for self-consumption. Lastly, we consume CO2 at our sea water desalination plants (IDAM) as part of our remineralization process, thereby sequestering the CO2 in the water. Baseline year 2030 Target -25% 2,467,794 t CO2 eq 2050 Target Carbon neutrality 135 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.3 Circular economy [3-3] The production system developed in the last few decades, based on extracting natural resources to manufacture products that, once used, end up in landfills or in nature, is not sustainable. Consequently, it is now absolutely crucial to move the circular economy model forward, with the aim of

maximizing the available resources so that they remain in the production cycle for as long as possible, minimizing waste and air pollution, and regenerating nature, contributing financial, natural and social capital. At Sacyr we commenced that journey some years ago and when it comes to the practical implementation of the circularity model, some of our action principles, included in our Circular Economy Policy, are as follows:

- To effectively apply the waste hierarchy principle.
- To move away from the use of non-renewable natural resources.
- To reduce the use of renewable resources.
- To increase the use of secondary resources (recycled).
- To promote sustainable sourcing by acquiring materials and products that incorporate secondary resources in their manufacture, that can be repaired and reused or recycled at the end of their useful life.
- To promote ecological design so as to reduce the environmental impact at every stage of the product or service from a life-cycle perspective.
- To foster optimization of resources, process efficiency, a commitment to renewable and low-emissions energy resources and the implementation of more efficient technologies.
- To prevent and reduce food waste.
- To promote and support process and project innovation that benefits the circular economy.
- To foster awareness, consciousness and training initiatives for our employees, users and value chain in connection with the principles of the circular economy.

In 2023 we updated our Circular Economy Policy to further strengthen our commitment to preventing construction and demolition waste (CDW) and foster the repurposing of whatever waste that could not be avoided. This Policy's action framework is implemented through Sacyr's circular economy model, aimed at optimizing the use of resources, preventing and managing waste and committing to businesses aligned with the circularity principles, all in collaboration with our value chain. Rota de Santa Maria. Brazil Integrated Sustainability Report - 2023 136 Sacyr's Circular Economy Model Value chain (companies, institutions, manufacturers, suppliers, customers, providers, collaborators, contractors, sub-contractors, society, etc.) Businesses aligned with the circularity principles Waste prevention and management Optimization of resources

- To foster innovative and sustainable business models.
- To integrate circularity principles in our activities.
- To promote collaborative and shared economy business models.
- To prevent the generation of hazardous, non-hazardous and construction and demolition waste.
- to reuse materials and recycle waste.
- To recover material from waste.
- To reduce the consumption of renewable and non-renewable resources.
- To use resources efficiently.
- To reuse materials generated in the activity.
- To increase the use of secondary resources (recycled).

By transforming our economy from linear to circular, we shift the approach from extraction to regeneration, and instead of degrading nature, we build natural capital. 137 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

By using this model our aim is to voluntarily achieve three priority objectives: The circular economy gives us a framework of opportunities to tackle global challenges like climate change, biodiversity loss, waste and pollution. Increase the use of recycled materials. Build partnerships and intensify collaboration with the value chain to promote the circular model. Increase the percentage of waste reuse to 80% by 2025. Prevention, preparation for reuse and recycling. Prevention, preparation for reuse and recycling. 2 Preparation for reuse. 3 1 We have also set targets for reducing greenhouse gas emissions and own water consumption. To achieve the goals linked to the circular economy we have a Zero Waste Plan that defines the various lines of action and initiatives associated with each of them. In 2023, this commitment was embodied by the following achievements: 45% 19% 97% Reduction of hazardous waste generated of recycled materials consumed of construction and demolition waste 97% of waste recycled, reused and recovered To achieve a fully circular economy, circularity must be woven into the entire value chain. The shared value generated is the indispensable response to achieve development that combines competitiveness with innovation

and sustainability. At Sacyr we integrate the circular economy throughout our value chain and this includes everything from presenting more circular proposals to customers, to working with manufacturers and suppliers to reintroduce reusable resources from waste into the production process, to acquiring sustainable resources and ecodesign. To achieve this, in addition to the Circular Economy Policy, we have the Supply Chain Management Policy and the Code of Ethics and Conduct, that extend Sacyr's commitments, policies and values on circular economy to the entire chain, also nurturing a sustainable relationship between projects and their environment. Integrated Sustainability Report - 2023 138

- Changes in the availability of resources and shortages.
- Increase in environmental costs due to regulations.
- Generation of waste and unavailability of options to recover it in certain locations.
- Exposure to energy and commodity price volatility.
- Higher raw materials and operating costs.
- Loss of market competitiveness.
- Harnessing of resources derived from our own activity.
- Reduction of the consumption of natural resources.
- Prevention of waste generation.
- Fostering process circularity.
- Lower operating costs and higher revenues.
- Increase in market competitiveness.

We have a Buy Green Recommendations Guide oriented towards purchasing more environmentally friendly products and services, helping to create an increasingly conscious and collaborative supply chain. Within the framework of the Integrated Management System, we identify and assess the risks and opportunities associated with our activities, and the main risks and opportunities associated with the circular economy, as well as the related financial impacts, are: RISKS FINANCIAL IMPACTS OPPORTUNITIES Maintenance of A1 Burgos road. Spain 139 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Strategic partnerships and collaborations to foster the circular economy We contributed to the Practical Guide for Circular Business Management in Chile Alongside another seven multinationals, Sacyr contributed to the first edition of the Practical Guide for Circular Business Management in Chile, a document resulting from a collaboration led by SOFOFA, SOFOFA Hub and the Territorio Circular program (promoted by Corfo and the Ministry of the Environment and executed by SOFOFA Hub), which contains specific internal management practices implemented by companies to shift from a linear to a circular economy. The best practice in terms of circular management outlined by Sacyr in this guide was its Circular Economy Policy. The launch of this guide is another milestone in compliance with the roadmap for a circular Chile by 2040, aimed at transforming production processes to make the circular economy drive the country towards sustainable development. We support the materialization of the Peruvian Pact for a Circular Economy We collaborate with the European Commission's Environmental Policy Programme At Sacyr Concesiones we take part in a working group within the framework of the Peruvian National Circular Economy Coalition to materialize the commitments enshrined in the Peruvian Pact for a Circular Economy. These working groups were launched by Peru's infrastructure association (Asociación para el Fomento de la Infraestructura Nacional-AFIN), which encompasses the leading public service infrastructure concession companies, of which we are a member. We belong to group 4 "Managing know-how to develop and strengthen capabilities and skills", aimed at identifying and systematizing circular economy best practices driven by business, academia, the public sector and civil society, and to systematize and disseminate these best practices. We responded to the call for contributions for the preparation of the forthcoming environmental policy of the European Commission (2024-2029), submitting recommendations and concerns in connection with the issues posed by the Commission: circular economy, biodiversity and pollution. Integrated Sustainability Report - 2023 140 6.3.1 Optimization of resources We use a range of resources in our activities, including materials whose production implies the consumption of renewable and non-renewable raw materials such as timber,

water, energy and land, which exerts considerable pressure on the environment. Accordingly, we are committed to and foster circularity, which enables us to mitigate significant environmental challenges such as climate change, the shortage of natural resources and the loss of natural capital. The supply of sustainable materials that generate a lower environmental impact is an action line within [301-1] >

Materials used by weight (t)*	** Steel	210,039.57	74,262.53	64,862.66	Aggregates	5,742,059.63
5,462,188.45	5,116,959.56	Concrete	1,730,508.14	768,071.49	1,215,620.82	Asphaltic materials
108,740.74	252,758.80	195,150.63	Earth	6,647,954.42	6,765,827.26	1,508,518.93
2,297.09	574.89	Cement	183,850.76	195,670.58	217,611.35	Paper
93.28	88.28	46.09	2021	2022	2023	*

Includes consumption of the most significant materials. ** To calculate figures for both total recycled materials used and recycled materials used, direct measurements and estimates are employed. Direct measurement data are entered in different tools and come from invoices, contracts, orders, etc. For estimates, in most cases we use the weight given by manufacturers for a unit of a certain material whose properties we know, and in others we take the known weight of a material with similar properties. Sacyr's Zero Waste Plan, which applies to all the organization's businesses. Accordingly, we seek and adopt initiatives that best suit each project. These initiatives involve reducing the consumption of nonrenewable and renewable natural resources and materials, optimizing and maximizing resources in production and consumption, prioritizing the choice of materials that harness secondary resources for their manufacture and have a lower carbon footprint, reusing materials generated in the activity itself and opting to acquire both recycled materials and those that are repairable and can be reused or recycled at the end of their life. Below is a detailed view of the consumption of the materials that are most important for our projects: The construction and infrastructure sector needs substantial quantities of materials whose manufacture consumes large amounts of virgin resources. For example, aggregates are an indispensable raw material in these activities and one of the most consumed resources on the planet. In all our construction projects, we promote the reuse of excavated earth on site, either as a base material for backfilling or in recycled aggregate form to make concrete. We also aim to find a second life for excess material from excavations, helping to restore quarries and mines and supplying other projects with a shortage of such materials, to prevent it from ending up in landfills. Furthermore, Sacyr Construction is authorized to recover materials such as earth, gravel, concrete and bituminous mixtures left over from other projects, for their use in backfilling for its own projects. These initiatives allow us to reduce the acquisition of new materials, avoiding the exploitation of virgin natural resources and the ensuing impact on nature, preventing the generation of construction waste and its removal to landfills; this means using fewer raw materials, saving energy and water, reducing CO2 emissions and costs, and lengthening products' life cycle. 141 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

To manufacture aggregates or backfilling for use in works other than those where they are generated In the Langosteira Railway Access Joint Venture (Spain), part of the leftover material from the tunnel excavation, originally planned for landfill, is instead being sent to two materials production plants, located near the project, to obtain recycled aggregates that are later used to make concrete and gravel; another part of the earth is being taken to a nearby project where there is a shortage of this material, to be reused. In 2023 we avoided the generation of 156,088 t of waste destined to landfill and, accordingly, the emission of 30 t CO2 eq. For use as structural backfilling in the same project In the San Luis Buin-Paine Hospital project (Chile), excavated material is being used for structural backfilling; the material is taken to a crushing plant near the project site where a product is obtained that is reused in the same project. In 2023, 12,247 t of material was recovered in this process. For manufacturing aggregates for reuse in the

same project In the Rebuilding of the Dr. Sotero del Río Health Complex (Chile), the material from excavating the land to attain the level for the project is being reused to obtain aggregates that are subsequently used to make cement as the foundation material of structural backfilling and to make roads within the works site. A total of 263,244 t of material was recycled in this project in 2023, avoiding, by not dumping it in landfills, the emission of 325 t of CO₂ eq, as well as not having to purchase aggregates. Use of excavated material For the environmental restoration of a former mining operation In the Construction Project of the PalenciaAguilar de Campoo (Spain) High Speed Railway Line, part of the earth left over from excavation, which in the project plan was to be sent to landfill, is being reused as backfilling for the environmental restoration of a former and abandoned lay mining concession in Palencia. It is estimated that a total of 585,000 t of material will be contributed, giving it a second life and preventing its disposal. In 2023, more than 156,356 t of surplus material was used, also avoiding the emission of 129 t of CO₂ eq. This restoration will, furthermore, recover a surface area of approximately 28,700 sqm for agricultural use. In addition, we reused other materials generated in our activities and we work closely with customers, suppliers, subcontractors and partners to analyze and acquire sustainable products, i.e. products manufactured using secondary materials, that have a lower carbon footprint, incorporate ecological design criteria, generate less waste and may remain in use for as long as possible, also based on their repair and recyclability properties. As a result of the application of these measures, in 2023 the consumption of recycled materials was 19.04%. These materials include earth, agglomerates, steel and paper. Moreover, more than 20% of the timber consumed is certified to FSC and PEFC standards, with this percentage reaching 67% in Spain. Integrated Sustainability Report - 2023 142 Sustainable construction materials with a lower carbon footprint and a high degree of recyclability are essential for us and our customers. The entire value chain's commitment enables us to continue moving forward in the circular production and consumption model. [301-1] [301-2] > Recycled materials used Recycled or reused materials (t) 6,815,989.44 6,825,240.45 1,583,687.10 Recycled or reused materials (%) 46.60 50.48 19.04 2021 2022 2023 Our Conflict Minerals Statement outlines the commitment to legal and ethical compliance in business practices involving the use of materials such as coltan, gold, cassiterite, tungsten or their derivatives. We extend this commitment to our supply chain (suppliers, providers, contractors, collaborators, sub-contractors) to ensure the traceability of these materials in the Supply Chain Management Policy. Recycled aggregates In our projects, the use of recycled aggregates, acquired or obtained in the projects themselves from land clearing works, is a widespread practice. It was implemented at numerous sites in 2023: 104 homes in Salix, Node Carabanchel, 56 homes in Artola Alta Marbella and 95 multifamily homes in Sector Llevant, all in Spain, and in the project to rebuild the Dr. Sotero del Río Healthcare Complex and the San Luis de Buin Paine Hospital in Chile, with a consumption of more than 287,400 t. Metallic barrier The Autovía del Turia Concesionaria de la GV highway project (Spain), during the work to expand a section of the highway more than 6,000 meters of barrier were removed. The barrier system was stored at the operating center for subsequent use and more than 2,500 meters have now been recovered and reused. This allows us to give the material a second life, preventing it from going to waste and, at the same time, achieving considerable savings in terms of both resources and finance. Insulation In the construction of the Hernani-Astigarraga section of the New Basque County Rail Network (Spain), executed by the Hernani-Astigarraga Phase II Joint Venture, approximately 6,000 sqm of elastomeric sheeting made from recycled rubber (used tires) was placed in the sub-ballast to protect the platform and nearby areas from vibrations. Consumption of sustainable materials 143 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9

Appendices JV Elorrio. Spain Sustainable concrete Concrete is one of the most environmentally impactful materials. By using sustainable concrete, with a lower carbon footprint, we help preserve natural resources, reduce waste and, when these materials reach the end of their life, they can be recycled and reused as aggregates to make new products. In the Hernani-Astigarraga Phase II and Elorrio Joint Ventures (Spain), we are using concrete made from more sustainable cement, whose carbon footprint is 20-40% lower than the conventional equivalent, contains similar percentages of recycled materials and prioritizes the use of local Asphalt with environmentally friendly additives Sacyr Concesiones used an eco-friendly additive in the asphalt of the Eresma Highway (Spain). This innovative product, called Bioroad, developed by UNICO GREEN, is made of olive oil processing waste and recycled vegetable oil. Bioroad asphalt mixes are produced at lower temperatures, saving energy and reducing the carbon footprint, as well as making the asphalt mix more durable. In 2023, more than 300 t of asphalt mix were made using this additive. Self-leveling mortar with recycled fibers For the execution of the 95-home residential complex in Sector Llevant (Spain) screed floors are being made inside the homes using selfleveling mortar that includes 56 kg of 100% recycled polymeric fibers per m³ of mortar. In addition to being a recovered plastic, these polymers improve the thermal and acoustic insulation capacity of the screeds. In 2023, 27,160 kg of these fibers were consumed. raw materials, as well as having an Environmental Product Declaration. To achieve this, the cement has reduced its clinker content and increased its fly ash content, which also reduces the waste produced in other industries such as thermoelectric plants, and provides an alternative to natural raw materials. In 2023 more than 19,650 m³ were used in these projects. In the 95 multifamily homes in Sector Llevant (Spain), we are also using concrete whose manufacturing, as compared to conventional concrete, considerably reduces Co2eq emissions, by around 17%, optimizes the use of resources and increases its durability. In 2023, 7,278 m³ were used in the project. Integrated Sustainability Report - 2023 144 6.3.2 Waste prevention and management [3-3] [306-1] [306-2] Sacyr's Zero Waste Plan has other lines of action that apply to all the organization's businesses, resulting from the effective application of the principles of waste hierarchy, which, by order of priority, is as follows: • Prevent the generation of hazardous waste, nonhazardous waste and construction and demolition waste (CDW). • Maximize preparation for reuse and recycling of waste, with a particular focus on construction and demolition waste (CDW). • Foster and boost other kinds of recovery, including energy. • Avoid disposal. One key area, essential to accelerate the transition towards a circular economy model, included in the European Commission circular economy action plan, is construction, including of buildings, which is responsible for more than 35% of total waste generated in the EU. Most notable is the considerable scope for improvement in construction and demolition waste (CDW). At Sacyr, construction and demolition waste accounts for more than 95% of all waste generated. Consequently, when it comes to managing it we prioritize the reuse of materials such as earth, metals, timber and rubble and we recycle and recover construction and demolition waste that it has not been possible to avoid. This helps ensure that the materials in this waste rejoin the production cycle as secondary raw materials. At Sacyr these materials are primarily rubble, concrete, metal, timber, plastic, plant waste, paper and cardboard. The project locations must allow this, as the possibilities for recovering this kind of waste depend on the availability of authorized facilities in the locations where we operate. We are aligned with the DNSH (Do Not Significant Harm) principle established in the Commission Delegated Regulation (EU) 2021/2139 concerning the European Taxonomy for the climate change mitigation and Climate change adaptation goals. This provides that at least 70% of non-hazardous construction and demolition waste generated at construction sites be processed for reuse, recycling and other forms of recovery. In this regard, we are working to comply with the technical selection criteria of the Commission Delegated Regulation (EU)

2023/2486 concerning economic activities that contribute to the circular economy objective, bringing this percentage up to 90%. All the projects, wherever applicable, have a waste management plan detailing at least the types of waste expected to be generated (construction and demolition waste, hazardous and non-hazardous waste), an estimated amount by type and fraction, the goals in terms of prevention, reuse, recycling and recovery, the measures to be implemented to achieve these goals and how the waste will be identified and separated at source. We also have procedures regarding waste prevention and management that, within the framework of the legislation in force in each country or region, establish contractual requirements on waste prevention, identification, sorting or separation, classification, labeling and storage, as well as best practices for waste management based on the waste hierarchy. Projects and facilities operated by Sacyr issue the relevant communications as waste generators and recoverers and are compliant with the requirements established in terms of separation, temporary storage, delivery for transport and proper treatment, always using authorized management companies for this purpose. In all our projects we promote the contracting of managers who can make the most of the material resources contained in them, based on the management priority established in the waste hierarchy, wherever this is possible.

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Diagram of materials at Sacyr Preventing the generation of hazardous waste, nonhazardous waste and construction and demolition waste (CDW) is a priority when it comes to managing our activities. To achieve this, in all projects organizational and operating measures are taken aimed at reducing, to economically and technically feasible levels, the amount of these kinds of waste that is generated. These measures include: product market research to procure those designed to generate least waste in optimal amounts, choice of materials and products based on ecological criteria, replacing hazardous materials with others that are non-hazardous, buying products in returnable and reusable packaging as large as possible, agreements with the supply chain to return leftover materials, analysis, readaptation and redesign of construction processes to optimize the use of materials—thereby preventing waste generation, and using resources that can be repurposed or recycled at the end of their life. One of the challenges for 2024 is to reduce by 1% the amount of hazardous waste generated and increase, by the same percentage, the non-hazardous waste not bound for disposal, with respect to the previous year.

Rutas del Este. Paraguay 19.04% 97.16% 2.84% Waste disposed of Reused, recycled and recovered waste Recycled materials

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 146 Used waste bags In 2023 we launched a Grupo Mondi initiative, the first of its kind in Spain, allowing us to stop treating used waste bags as hazardous waste on construction sites. The initiative consists of separating at the site the bags clean of cement, plaster, cement, glue, etc., placed in big-bags, which are removed by a construction and demolition waste (CDW) manager, who takes them to special treatment plants where they are recycled to obtain paper with which to make new bags. This initiative was implemented at the 104 homes in Salix and 708 workshops in Argis projects, both in Spain, where more than 2.6 t of bags were collected, thereby reducing the hazardous waste generated and increasing the percentage of recovered waste. In addition to Grupo Mondi, various construction waste and recycling partners contributed to the success of this initiative. Prefabrication of building components Prefabrication of building components, among other benefits, reduces the generation of hazardous waste on works sites and in factories because industrialization processes are used to optimize the resources involved in manufacturing, also resulting in less material wastage. Our preference is for modular construction and, specifically, for the installation on works sites of prefabricated toilets avoiding hazardous waste from products such as silicones, foams, foaming agents, cement glue or resins. In 2023 this practice has been

implemented at the 708 workshops project in Argis, 104 homes project in Salix and Node Carabanchel, all of them in Spain, where 1,889 prefabricated toilets have been installed. Moreover, this initiative also allows us to reduce non-hazardous construction and demolition waste generated at works sites, such as bricks, ceramic materials, plasters and insulation. Bulk mortar By bulk sourcing the mortar commonly used in masonry work, storing it in silos at the works site, we manage to eliminate the bag waste that would be generated if it were supplied in bags. This measure is applied, for example, at the 95 multifamily home project in sector Llevant Viladecans (Spain), avoiding the generation of 38,230 empty bags as waste. We prevent and reduce hazardous waste generation Pajares joint venture. Spain 95 multifamily homes in sector Llevant Viladecans. Spain 147 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices By switching from traditional bricks to large-format ones like thermo-clay or Satecer it is possible to approximately halve the amount of binding agent used and, furthermore, Tector (large-format adhesive) barely generates any waste compared with mortar. In 2023, this practice was implemented in Fractal residential complex, the 88-home Mendoza complex and the 44-home Argea complex, all of them in Spain, after being proposed to customers and accepted. Some 42,000 sqm of traditional brick has been replaced by Satecer. At other works in collaborative projects in which traditional partitioning had been defined, it was redesigned and changed to large format. This was the case at the 196 homes in the Zaurak residential and 708 Argis workshops projects, where some 58,000 sqm of walls were modified. Switch from traditional to large-format bricks Plasterboard Manufacturers and suppliers are increasingly committed to incorporating the circular economy in their manufacturing processes, working closely with their stakeholders. One example of this is the 95 multifamily homes in project in sector Llevant Viladecans (Spain), where the plasterboards were custom-manufactured in accordance with the internal clearance height of each floor of the buildings. This reduced leftovers and, accordingly, generated less waste. We prevent and reduce the generation of non-hazardous construction and demolition waste Punta Langosteira. Spain Integrated Sustainability Report - 2023 148 The waste generated by Sacyr in 2023, by type and treatment method, is shown below: [306-2] [306-3] > Total weight of waste generated (t)** Waste generated Non disposal bound waste Waste destined for disposal Construction and demolition waste (CDW) 11,570,150.82 9,776,273.25 1,793,877.56 8,923,930.64 7,737,473.43 1,186,457.21 2,570,153.08 2,505,729.22 64,423.86 Non-hazardous waste (NHW) 44,126.59 25,193.60 18,932.99 38,972.42 26,778.41 12,194.01 14,405.42 5,794.44 8,610.98 Hazardous waste (HW) 2,094.87 568.97 1,525.90 1,075.43 525.44 549.99 592.43 168.48 423.95 TOTAL 11,616,372.27 9,802,035.82 1,814,336.45 8,963,978.49 7,764,777.28 1,199,201.21 2,585,150.93 2,511,692.14 73,458.79 2021 2021 2021 2021 2022 2022 2022 2022 2023 2023 2023 2023 * It includes excavated material in CDW to facilitate the interpretation of the information. ** To calculate the total weight of waste by type and the treatment management, we use an internal tool in which, for each project, the various kinds of waste generated are entered, along with the amounts and treatment management for each, whether internal or external by authorized managers. All the data are extracted from the tool and come from direct measurements included in documents such as the management and recovery certificates issued by the managers, as well as topographical calculations/measurements. Autopista Vial al Mar. Colombia In 2023, more than 97% of waste was recycled, reused and recovered, a significant increase over the 86.62% in 2022. 149 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Polystyrene waste recovery Much of the insulation waste generated on works sites ends up in landfills, even though manufacturers, suppliers and managers now offer options for its

recovery. At various sites, leftover polystyrene, both expanded and extruded, according to their type, is being recovered, cleaned and sorted into big-bags for repurposing. For example, this is being done at the Fractal Residential project and 95 multifamily homes in Sector Llevant project, both in Spain. In 2023, 3,840 kg were recovered and reintroduced in the production process. We contribute to circularity by recycling and recovering waste Recovering leftover plasterboard In collaboration with the manufacturer of plasterboard, a specialist in recovering plaster and the subcontractor tasked with the partitioning and suspended ceilings, in the 95 multifamily homes project in sector Llevant Viladecans (Spain) we plan to recover all the waste material of this kind generated on the site, and to repurpose 95% of it, transforming it into a secondary raw material used to make new products like cement. The remaining 5% is made of cardboard, which is also recovered. In 2023, 29,040 kg of leftover plasterboard was repurposed (27,298 kg of plaster and 1,742 kg of cardboard). The “Waste Electrical and Electronic Equipment (WEEE)” initiative Sacyr Peru implemented the “Recycling WEEE” initiative to ensure that equipment such as printers, telephones and computers that were not being used were reviewed to determine whether they could be repurposed. In coordination with various companies and institutions such as managers and service providers, more than 650 kg of electrical and electronic waste has been recovered, most of it hazardous waste. This initiative also contributes to social and local development, by creating green jobs at the WEEE recovery facility. This initiative in turn led to a second program called “Reusing with Sacyr Peru” in which a total of 20 computers were given a second life, after being repaired, being raffled among all collaborators of Sacyr Peru. Slope stabilization with used tires Concesionaria Vial Sierra Norte and Gestora de Servicios Viales (Peru) have reused approximately 3,600 kg of used tires, waste generated by road users, to stabilize erosion in a lower embankment of a sub-section of the P3 project and regain its service level. This optimizes resources by reusing material. Desalination membranes At the sea water desalination plants for drinking water in Oman, Algeria and Australia, more than 6,000 membranes that could no longer be used in the plant processes were sold to other water treatment plants for agricultural purposes where they are reused to remove salinity from well water, thereby giving them a second life cycle and avoiding their landfill disposal. Integrated Sustainability Report - 2023 150

The following table shows non-disposal bound waste, specifying which recovery operation was applied to it. [306-4]

Total weight of non-disposal bound waste (t)	Preparation for reuse	Recycling	Other recovery operations	TOTAL
Construction and demolition waste (CDW)	8,365,723.10	945,151.56	465,398.59	9,776,273.25
Non-hazardous waste (NHW)	7,145,641.91	376,914.45	214,917.07	7,737,473.43
Hazardous waste (HW)	1,844,048.32	388,395.47	273,285.43	2,505,729.22
TOTAL	16,508.05	8,087.51	25,193.60	669.14
	5,053.89	21,055.38	26,778.41	502.00
	4,462.18	830.26	5,794.44	168.48
	5.01	172.67	391.29	568.97
	0.34	311.36	213.74	525.44
	8.22	109.05	51.21	168.48
	8,366,326.15	961,832.28	473,877.39	9,802,035.82
	7,146,311.39	382,279.70	236,186.19	7,764,777.28
	1,844,558.54	392,966.70	274,166.90	2,511,692.14

2021 2021 2021 2021 2022 2022 2022 2022 2023 2023 2023 2023

In 2023, 1,449,224.33 tons of excavated earth were reused at works sites, representing 66.68% of the total excavated material. The Zero Waste Plan is our roadmap for strengthening a circularity model across all our activities. This plan is aimed at increasing the use of recycled materials, attaining 80% of reused waste and intensifying our collaboration with the value chain.

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The table below shows the disposal bound waste, which is 2.84% of the total generated, specifying what happens to it (incineration, landfill or other disposal). [306-5]

Total weight of disposal bound waste (t)*	Incineration (without energy recovery)	Incineration (with energy recovery)	Landfill	Other disposal operations	TOTAL
Construction and demolition waste (CDW)	2.56	0.00	1,792,630.78	1,244.22	

1,793,877.56	0.00	0.00	1,185,842.03	615.18	1,186,457.21	0.00	183.53	33,510.02	30,730.31	64,423.86
Non-hazardous waste (NHW)										
6.47	0.00	16,606.88	2,319.64	18,932.99	15.82	12.72	5,871.36	6,294.11	12,194.01	1.10
96.78	7,055.88	1,457.22	8,610.98	Hazardous waste (HW)						
10.49	0.00	323.26	1,192.15	1,525.90	8.27	0.00	158.75	382.97	549.99	2.53
6.08	226.93	188.41	423.95	TOTAL						
19.52	0.00	1,809,560.92	4,756.01	1,814,336.45	24.09	12.72	1,191,872.14	7,292.26	1,199,201.21	3.63
286.39	40,792.83	32,375.94	73,458.79	2021	2021	2021	2021	2022	2022	2022
2022	2022	2023	2023	* All disposal bound waste						

is managed by authorized managers outside the organization's facilities. In 2023, 184.01 tons of excavated earth were disposed of, representing 0.01% of the total excavated material. Sotero Del Río Hospital. Chile Integrated Sustainability Report - 2023 152 InfraTec Global España, which develops and markets the IOHNIC lighting system, has signed a contract to join the Collective System of Extended Producer Responsibility for electrical and electronic equipment managed by the Ecoasimilec Foundation (Recyclia), and is listed in the Integrated Industrial Registry of Electrical and Electronic Equipment in Spain. In this regard, it is also listed in the registry of electric appliance manufacturers in Italy and is a member of the Ecolight Foundation. These collaborations allow us to control the generation of waste from this kind of appliance and ensure it is properly environmentally managed once its useful life comes to an end. For this purpose, an ECO WEEE fee is charged to guarantee the entire recycling and environmental management process of all the products delivered to our customers. InfraTec Global España also recently signed an initial commitment with Recyclia to collaborate in the design and development of its new Collective Extended Producer Responsibility Scheme (SCRAP) for waste from commercial and industrial packaging. SCRAP schemes establish a shared responsibility throughout the value chain, promote the reuse and recycling of waste to prevent its being sent to landfills, reduce the usage of natural resources and the greenhouse gas emissions generated, and are a key tool to foster the circular economy.

6.3.3 Businesses aligned with the circularity principles

At Sacyr, we have set ourselves voluntary and ambitious targets for reusing waste, reducing greenhouse gas emissions, increasing the use of sustainable materials and reducing our own water consumption, all aligned with our circular economy model and with the aim of progressing towards zero waste. We actively foster a circular culture both internally and externally. To achieve this, we have integrated the principles of circularity in our business model, including all projects and encompassing the entire value chain (customers, manufacturers, suppliers, subcontractors, collaborators and employees, etc.): in the design, construction and maintenance of infrastructure, in the execution of building projects, some in a collaborative framework and others with sustainable certification, and in the management of P3 assets. This ranges from planning activities, when we consider how to optimize resources and processes, choosing sustainable materials and renewable energy sources, harnessing waste that cannot be avoided and recycling and repurposing waste that is generated, to the execution itself and including operation, maintenance and repairs aimed at extending the life cycle of assets. We offer a wide range of services in which the circular economy is at the forefront:

- IOHNIC. Innovative business models, with a focus on ecodesign, as at Sacyr Concesiones, which has developed, approved and patented its IOHNIC solution, which it markets through InfraTec. This sustainable LED lighting system for tunnels combines innovative design with energy saving and a long life cycle of all the components, along with a rigorous manufacturing process that contributes to the transition to a circular economy model. These light fixtures are repairable at the end of their useful life through reindustrialization and 90% of their components are reusable after more than 15 years of use, and their non-integrated component design means a single part of the fixture can be replaced, rather than the entire fixture, thereby reducing the waste generated and avoiding the consumption of natural resources; in the driver's case, due to the way IOHNIC lighting is designed, the useful life is more than 15% longer

than the industry average. In 2023 new optics were developed for these lights that enhance energy savings even further, to almost twice that of previous versions. 153 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.3.4 Prevention and reduction of food waste

When food is wasted all the resources used to produce it are also wasted, including fresh water, land, energy and capital, reducing the available natural resources, eroding biodiversity and ecological integrity and increasing greenhouse gas emissions. Preventing and reducing food waste requires the action and involvement of every stage of the food value chain, from food producers, suppliers and retailers, to restaurants and even employees and consumers. Cafestore, a Group company specializing in collective catering services, faces the challenge of reducing food waste, and its focus is on three main goals: In addition, new lighting was created for underground car parks, a development of tunnel lighting that saves almost 90% more energy than previous iterations. This provides a so-called "moonlight" solution that lights up the entire car park at very low consumption. This lighting provides customers with good vision and a feeling of safety for areas that are not affected by motion; since they incorporate motion sensors, they provide the level of lighting required in the area around the sensor. At the same time, this is a solution that combines environmental and financial criteria: in addition to using less energy, the system incurs controlled costs that are stable over time. The main materials we use in the packaging of these light fixtures are paper and cardboard, since they have high recycling rates. Less than 5% of the material used is plastic, although it is mainly low-density polyethylene, which like other thermoplastics, is recyclable. In 2023 we placed more than 14 kilometers of tunnels into service, specifically in the Malo tunnel in Concesionaria Pedemontana (Italy) and the PamplonaCúcuta project (Colombia) in Functional Units 3 and 5. Furthermore, our car park lighting (IOHNIC parking) was installed in the Moncloa Transportation Hub in Ciudad Universitaria, Madrid (Spain) and comprises a total of 2,000 fixtures across five floors.

- Moevo Green. We are also committed to sustainable mobility. In 2023 we set up a company, Moevo Green, whose purpose is the industrialization and marketing of innovative electric vehicles for cleaning large surface areas and for last-mile delivery.
- Novality Green. Another company launched in 2023 was Novality Green, for transforming future mobility by marketing multimodal urban parking for bicycles and electric scooters. These parking spots will be watertight parking hubs accessible via an app or passcode in which to safely leave a bicycle, scooter or items of personal property, and will include recharging points using renewable energy generated by solar panels, incorporated into the structure itself, in which to charge the vehicle's battery while it is stored. This fosters an energy model based on renewable energy sources, as opposed to using fossil fuels that are highly polluting and destroy ecosystems. Furthermore, it contributes to the electrification of key sectors such as city transportation.

Prevention of waste. Awareness and training to optimize the consumption of resources. Repurposing of food before it is wasted. 1 3 2 Cafestore Integrated Sustainability Report - 2023 154 In 2023 we signed a collaboration agreement with Bumerang to provide users with reusable containers at no additional cost. These are recyclable and lasting returnable containers, unlike single-use compostable containers. One more step towards Zero Waste. For this purpose, it has implemented various measures, which notably include: These measures have resulted in: Cafestore is in the process of eliminating single-use plastics, including cutlery packaging, non-recyclable and recycled Tupperware containers, disposable cups, PET water bottles and plastic bags, which are being replaced by packaging made of cardboard and biodegradable and compostable PLA material. The use of Tupperware containers has also been reduced thanks to the awareness campaigns it has staged. Review of all existing recipes to adjust ingredients and cost breakdowns so as to reduce leftover waste, having eliminated 2% thereof. Collaboration with Too

Good To Go, for reactive management of food waste. Cafestore is currently collaborating with 11 centers, resulting in a total of 1,637 food packs saved in the last 12 months (equivalent to 4.09 tons of CO₂ not emitted). Promotion of research into the viability of foods to extend their useful life, allowing us to adjust products' best before dates as far as possible while guaranteeing adequate quality, in accordance with regulations in place. Talks for an agreement to donate food products to the Food Bank and the Red Cross. "Incident reporting channel" to report incidents in connection with the preparation and service to rule out dishes where leftover waste is high and that are consumed by a minority. Recovery of 100% of leftover oil from frying, using more than 19 tons to make biodiesel. 1,637 packs saved, 8% more than in 2022, equivalent to 4.09 t CO₂eq emissions prevented. the recovery of leftover oil to make 100% biodiesel. 155 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.4 Natural capital 6.4.1 Natural capital management [3-3] Natural capital refers to the conjunction of elements of nature that benefit society, such as by curbing or eliminating CO₂, protection from land erosion and fire risk, wildlife habitats, pollination and natural processes and functions. These benefits are known as ecosystemic services and are indispensable for society, playing a pivotal role in reducing the effects of climate change. Since our inception, caring for the natural environment has always been a priority in our projects. That is why we are committed to nature protection and conservation, analyzing the risks and dependencies on natural capital and locking conservation objectives into 100% of new contracts as well as undertaking to reduce our own water consumption by 10% in 2025. Through our Integrated Management System, we implement strict operational controls and preventive measures to reduce our impact on ecosystems. Under this system, more than 83% of our activities are certified to ISO 14001 standards. Furthermore, we comply with the environmental legislation in each country and we monitor the Environmental Surveillance Plans (ESPs) or similar plans that derive from such environmental permits. 5th Colombian Congress on Ecological Restoration We took part in the 5th Colombian Congress on Ecological Restoration, delivering a paper on the restoration of degraded ecosystems in Canal del Dique in which we explained how, in the implementation of 36 projects in 14 functional units, we seek to protect biodiversity in the region and at the same time mitigate the risk of flooding. We launched a mini tutorial on natural capital To bring everyone in the organization on board, we have developed an online training itinerary through our Explora platform, which explains what natural capital is, its global importance, current regulatory and market trends, impacts and dependencies, and why it should be valued. Natural Capital Report We published our Natural Capital Report for the first time, showcasing Sacyr's governance model, the company's impacts and dependencies and the risks and opportunities related to nature, in line with the Taskforce on Nature-related Financial Disclosures (TNFD) guidelines. In 2023 we highlight the following milestones in our actions in connection with nature: Integrated Sustainability Report - 2023 156 Governance Strategy Risk management Metrics and objectives Over the course of this chapter we present Sacyr's governance model in connection with natural capital management, the company's impacts and dependencies and the risks and opportunities related to nature, in line with the Taskforce on Nature-related Financial Disclosures (TNFD) guidelines published in September 2023. 6.4.1.1 Governance Disseminating the organization's governance with respect to the dependencies, impacts, risks and opportunities related to nature is one of the four pillars included in the TNFD guidelines. Our commitment to the protection and conservation of the environment is enshrined in our Quality, Environment and Energy Policy, which guides our actions in this sphere. We also have a Biodiversity Policy, aimed at all our stakeholders and approved by the Board of Directors, which defines and establishes the principles and criteria governing our actions with respect to biodiversity. Its purpose is the preservation, restoration and

sustainable use of ecosystems, stopping the loss of biological diversity and halting deforestation, restoring impoverished soils and releasing and increasing financial resources. Our Biodiversity Policy covers the operating sites we own, lease or manage that are located in or near biodiversity-sensitive areas. Furthermore, the Water Policy guides our actions on the care, conservation and sustainable management of this resource. We involve our entire supply chain in nurturing the environment. We actively promote nature protection in our dealings with stakeholders, analyzing the biodiversity strategies of our suppliers in their approval process and in the company's Code of Ethics and Conduct, which is binding on all collaborators. To ensure the integration of the environmental aspect, the application of the policies and the fulfillment of the established goals, we set up the Sustainability and Corporate Governance Committee, a delegate committee of the Board of Directors, and the Sustainability Committee, which are the most senior bodies responsible for sustainability matters. In 2022 we created a Biodiversity Committee to strengthen our commitment to the environment. The Committee is led by the Corporate General Manager and includes environmental experts from all areas of the company. The Quality, Environment and Energy Department is responsible for ensuring compliance with Sacyr's environmental commitments, underwriting the quality of its projects, preventing or minimizing the potential impact of its activities on the environment and anticipating future risks. Los Colorados Sanctuary for Fauna and Flora.

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SUSTAINABILITY AND CORPORATE GOVERNANCE COMMITTEE

- Ensures compliance with policies and objectives.
- Tackles topics relating to the organization's management and performance in connection with water and biodiversity.
- Meets quarterly.

BIODIVERSITY COMMITTEE

- Establishes initiatives and reviews actions and metrics in connection with water resources and biodiversity.
- Has working groups that trigger measures in all the countries where we operate.
- Meets every four months.

BOARD OF DIRECTORS SUSTAINABILITY COMMITTEE

- Develops and executes the policies.
- Meets quarterly.

MANAGEMENT COMMITTEE

- Comprises the executive bodies and management team.
- Meets monthly.

QUALITY, ENVIRONMENT AND ENERGY DEPARTMENT

- Tasked with ensuring compliance with objectives linked to Natural capital (Biodiversity and Water).
- Guarantees the quality of the actions executed.
- Analyzing and avoiding risks linked to nature.

BUSINESS DIVISIONS AND UNITS

- Provides information to identify and assess risks.
- Implements actions to combat the loss of natural capital.

6.4.1.2 Natural Capital Plan

For the integral management of these impacts, we use the mitigation hierarchy as our guidelines, which allows us to project the impacts of our projects from an environmental and social standpoint, helping to avoid or minimize them, and performing restoration work to compensate for possible impacts or losses, generating a positive balance or a net gain. The mitigation hierarchy is aligned with the Precautionary Principle, one of the guiding principles of European Union environmental law, included in the EU 2020/852 Taxonomy Regulation, in which the potential impacts on the environment are analyzed from an absolute perspective.

Integrated Sustainability Report - 2023 158 This refers to measures that must be taken to avoid impacts from the outset; in other words, from the project conception phase, such as, for example, the careful spatial (on-site) or temporary placement of infrastructure elements on certain sensitive/ vulnerable components of biodiversity. These are measures taken to reduce the duration, intensity and/ or degree of impacts, including: direct, indirect and cumulative impacts that could not be avoided, as far as is feasible. These are measures taken to offset significant and adverse residual impacts that could not be avoided, minimized and rehabilitated or restored. Offsetting refers to the concept of ecological equivalence. These are measures adopted to rehabilitate the area in which life has been adversely affected by exposure to impacts that could not be

completely avoided and/or minimized. Source: modified from 2015 IUCN list. – Biodiversity values + Net zero loss Residual impact Net gain Prevent Biodiversity impact Biodiversity impact Biodiversity impact Minimization Minimization Prevention Prevention Prevention Prevention Minimization Restoration Restoration Biodiversity impact Biodiversity impact Equivalent compensation Additional benefits Impacts Minimize Restore Offsetting

6.4.1.2.1 Identification and assessment of potential impacts Since 2021, we have intensified our efforts to play a decisive role in our relationship with nature. Taking the mitigation hierarchy as a management approach, we conducted a materiality analysis to identify the most relevant ecosystemic services for our activity. We designed our own methodology to calculate natural capital balance and conducted an exhaustive study of our impacts, dependencies, risks and opportunities in relation to nature. We can classify this development into three phases: With the first phase of the project, called #MATERIA, the 20 most relevant ecosystem outputs were determined based on the CICES classification, mainly related to impacts associated with land use change and dependencies triggered by environmental regulations. In 2023 we worked with Natural Business Intelligence (NBI) to develop a tool that allows us to measure our impact on the environment by calculating the natural capital balance, based on the 20 ecosystem outputs identified as material to our operations in all the projects we carry out. In the second phase of this project, known as #DIANA, we identified the risks and dependencies on ecosystem outputs, associating specific measurement units for each of the outputs detected, and we defined a robust methodology to calculate the natural capital balance.

1 3 #MATERIA 2 NATURAL CAPITAL MEASUREMENT TOOL #DIANA 159 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

6.4.1.2.2 Mitigation Most significant protection measures [304-2] Preservation of the natural environment in the places where we operate is one of our paramount concerns in all our projects. Accordingly, we take action to preserve biodiversity, improve the populations of species and their habitats, and mitigate any potential environmental effect from our operations. These specific interventions are detailed in environmental management plans adapted to the specific regulations and conditions prevailing in each region and country. In 2023, the most significant impacts were alteration of habitat, impact on fauna and flora, and loss of plant cover. The measures carried out include the following: Actions to protect fauna Impacts detected Measures to prevent and minimize Collisions with wildlife due to the use of transport infrastructure Awareness through environmental training for the team involved in the project • Awareness campaigns on collision risk (Concesionaria Vial Montes de María in Colombia, Rutas 2 and 7 in Paraguay). Introduction of environmental signs altering to risk of wildlife collisions • Installation of road signs alerting to the presence of wildlife to prevent collisions (Rodovia in Brazil). Preparation of reports on fauna run over • Records of fauna run over (Rodovia in Brazil). Decline in population Preparation of monitoring reports on the status of the species • Fauna monitoring program (Rodovia in Brazil, Almudévar Dam joint venture, Armuña JV, Outer Port Access A Coruña JV, Hernani JV and Palencia Norte-Amusco high speed line in Spain, Linha de Évora and Linha de Algarve lines in Portugal, Sacyr Agua Chacabuco, Camán and Valles del Desierto wind farms in Chile, Concesionaria Vial Unión del Sur in Colombia). • Installation of camera traps at wildlife crossings (Rodovia in Brazil and Desarrollo Vial al Mar in Colombia). Wildlife survey, rescue and relocation • Amphibian and reptile rescue and relocation plan (Dr. Sotero del Río Hospital in Chile). • Rescue and relocation of fish (New Biobío railway bridge in Chile). • Controlled disturbance activities (New Biobío railway bridge in Chile). • Release of a Antillean manatee (*Trichechus manatus*) (Ecosistemas del Dique, in Colombia). • Rescue, transfer and relocation of wildlife (Pamplona-Cúcuta in Colombia and Rodovia in Brazil). • Relocation of native bees and isolation and monitoring of *Apis mellifera* (Africanized honey bee) (Rodovia

in Brazil). • Records of copro-necrophagous beetles (Concesionaria Vial Unión del Sur in Colombia). • Characterization and monitoring of marine communities (IDAM Alicante in Spain). • Handling, capture and translocation of wildlife (Chira-Soria pumped storage hydro plant in Spain). • Wildlife and birdlife surveys, nest detection and installation of a perimeter barrier to prevent wildlife from entering the site (Granadilla sewerage in Spain). • Fish census, control and monitoring of Palaeartic otters and other aquatic mesomammals in the river Jalón and study of birds (Mularroya Dam in Spain). • Removal of white stork (*Ciconia ciconia*) nests (AVE Plasencia Peñas Blancas JV in Spain). • Records of fauna run over (Rodovia in Brazil). Creation and maintenance of wildlife crossings • Creation of wildlife crossings (Autopista Al Mar 1 in Colombia, A-6 Drumahoe to Dungiven Dualling in Northern Ireland, Rutas 2 and 7 in Paraguay, Rodovia in Brazil and Elorrio Joint Venture in Spain). • Monitoring of wildlife crossings to determine their degree of use (Valles del Desierto in Chile). Habitat alteration and reproductive impacts Actions outside the species' nesting and breeding period • Monitoring of breeding colonies during the reproductive/nesting period while works are being executed, and environmental review of areas that may harbor nests of endangered species (Almudévar dam project, Joint Venture in Spain). • Temporary shutdowns to protect endangered species (Outer Port Access A Coruña JV, Variante Zafra JV and Elorrio JV in Spain). Integrated Sustainability Report - 2023 160 Actions to protect flora Impacts detected Measures to prevent and minimize Destruction of vegetation Transplanting and relocation of flora • Transplanting of specimens (Chira-Soria pumped storage hydro plant, Los Arejos-Níjar high-speed rail link and Tijarafe JV in Spain and Chacalluta Airport in Arica, Chile). • Transplantation of epiphytes and relocation of tree species that are immune to felling and/or endangered (Rodovia in Brazil). • Rescue, transfer and relocation of epiphytes and vascular species in closed season (Pamplona-Cúcuta in Colombia). • Rescue, relocation and maintenance of individuals belonging to the Orchidaceae and Bromeliaceae families (Pamplona-Cúcuta in Colombia). • Compensation for felling and uprooting of northern acorn tree (Re-tendering of Camino Nogales Puchuncaví P3 project in Chile). • Review of reforestation areas (Ruta 66-Camino de la Fruta P3 project in Chile). Construction of plant nurseries • Construction of plant nurseries on site (Chira-Soria and Tijarafe JV in Spain, Concesionaria Vial Montes de María in Colombia and Hospital General ISSSTE in Tláhuac (COHRSUR), Mexico). Actions to protect habitats Impacts detected Measures to prevent and minimize Indirect effect of accidental spills on protected habitats Analyzing water quality • Analysis and sampling of water from streams and watercourses (Elorrio and Hernani Joint Ventures in Spain). • Surface and groundwater monitoring (New Biobío railway bridge and Ruta 66-Camino de la Fruta P3 project in Chile). • Monitoring of inland aquatic ecosystems (New Biobío railway bridge in Chile). Destruction of habitat due to the creation of the dam basin Construction and/or rehabilitation and conditioning of nests • Rehabilitation and refurbishment of traditional rural buildings for the installation of nest boxes (wall nests, nests under adapted roof tiles, etc.) for lesser kestrel nesting (Almudévar Dam Joint Venture in Spain). Monitoring of restoration actions • Follow-up of the status of the hydroseeding of Mediterranean false brome (Almudévar Dam JV in Spain). Impact on wildlife due to loss of plant cover Compilation of inventories of affected species and their areas of distribution • Study of the local fauna and the ecosystems prior to the project (Ecosistemas del Dique in Colombia). Stolon method of restoration • Use of two forage and perennial species, kikuyo grass. (*Pennisetum clandestinum*) and African Bermuda-grass (*Cynodon nlemfuensis*) by sowing their stolons to restore embankments (Pamplona – Cúcuta en Colombia). Delivery of environmental training aimed at raising awareness to preserve fauna and flora • Awareness campaigns (Ecosistemas del Dique, Concesionaria Vial Montes de María, Unión Vial Camino del Pacífico, Desarrollo vial mar in Colombia, Linha de Évora in Portugal, Rutas 2 and 7 in Paraguay, new Biobío railway bridge in Chile). The activities generating these impacts have been carried out in an area of 105.58 km²

(170.37 km² in 2022 and 111.521 km² in 2021), the home to individuals belonging to 665 different species (450 in 2022 and 795 in 2021). Most impacts are direct, negative and irreversible, but in all project the necessary measures are taken and always in accordance with legislation in force. In addition, their duration is associated with that of the activity itself and in no case are considered material. 161 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

In 2023, we carried out awareness and protection initiatives:

- To celebrate Earth Day on April 22, our environmental team in the Autopista al Mar 1 project (Colombia) visited La Volcana school, located in San Sebastián de Palmitas township, where we planted 20 trees of various species. On the occasion we also took the opportunity to raise awareness among the children and the community about the importance of caring for and preserving the area's ecosystems, which are rich in fauna and flora. The children were delighted to take part in planting different species such as guayacán, chachafruto, chirimoyo, poma, chagualo and aguacatillo.
- In the Biobío New Railway Bridge project (Chile), on Earth Day we gave a talk on environmental education for children at the Alerce school. As part of the event, we handed out coloring books to around 30 pupils, featuring species of fauna near the project, all protected and some endemic (only to be found in the Biobío river basin, such as the Carmelita fish).

At Sacyr, we have an Integrated Risk Management System (IRMS), based on internal risk control and management standards issued by COSO ERM (Committee of Sponsoring Organizations of the Treadway Commission) and ISO 31000 (International Organization for Standardization), to facilitate key business decision-making, within a common risk culture, through a systemic and structured analysis of the risks inherent to our business. The Risks Committee is ultimately responsible for Sacyr Group's Integrated Risk Management System (IRMS) and all related decisions. As established in the framework of the Environmental Management System implemented to ISO 14001 standard, environmental risk management is one of the key aspects in any business, and at Sacyr our process is robust in this connection, identifying and assessing the risks and opportunities associated with our activities. Once identified, we set up an operational control framework for their proper management and monitoring. Specifically with regard to water, the main risks in accordance with the Environmental Management System implemented under the ISO 14001 framework are the scarcity and restriction of water resources, extreme weather events (such as drought, heat waves and floods) and regulatory changes relating to catchment and discharge permits, as well as fees, which may imply restrictions on the use or availability of water for carrying out activities and providing services, and may increase costs. Caring for our environment from an early age 6.4.1.3 Management of risks and opportunities Integrated Sustainability Report - 2023 162 RISKS Description Physical (chronic) or operational Operational risk linked to delays in environmental processing if there are protected habitats or species in the catchment area, and cost increase in remediation and offsetting measures. Transitional (policy/regulatory) or regulatory compliance More restrictive policies on biodiversity protection or climate change, reducing the options for building new infrastructure. Transitional (liability) or financial and reporting More stringent requirements for corporate ratings and reporting in relation to nature, climate change, water resources or biodiversity that shape access to financing. Physical (chronic) or operational Cost increase in remediation and offsetting measures. Physical (chronic) or operational Changes in environmental or weather conditions that affect the location of new infrastructure. More investment in adaptation measures. Transitional (reputational) Potential conflicts with landowners and increased costs of land purchase, lease or stewardship. Physical (acute) or operational Deterioration of water conditions resulting in operational shutdowns, payment of fines or drastic changes in operational processes. Transitional (markets, reputational) or strategic Loss of competitiveness related to meeting stakeholder

expectations. With the aim of continuing to improve our risk analysis, adapting to new frameworks, we have followed the guidelines established in the TNFD's LEAP methodology (Locate, Evaluate, Assess and Prepare). The main purposes of this analysis were: to analyze the sensitivity of ecosystems; to identify and gauge nature-related impacts and dependencies for all technologies and facilities; to assess risks and opportunities; and to serve as a decision-making tool in connection with nature risk assessment. Following TNFD methodology, we identified the businesses where there are potential impacts, dependencies, risks or opportunities in relation to nature. The risks and opportunities identified in this table apply to all of Sacyr's business units.

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KPI Management

- 83.40% of activity certified to ISO 14001 standard.
- 308.34 Restored and maintained area (ha).
- 730.4 Protected area (ha).
- 61 Conservation plans.
- Committed to nature protection and conservation.
- Service evaluation methodology.
- Technological tool to calculate the natural capital balance of our projects.
- Measures to minimize impacts on flora, fauna and habitats.
- 83.40% of activity certified to ISO 14001 standard.
- 308.34 Restored and maintained area (ha).
- 730.4 Protected area (ha).
- 61 Conservation plans.
- Continuous updating of the Criminal and Competition Risk Maps.
- Implementation of the MyR!SK tool.
- Measures to minimize impacts on flora, fauna and habitats.
- 83.40% of activity certified to ISO 14001 standard.
- 308.34 Restored and maintained area (ha).
- 730.4 Protected area (ha).
- 61 Conservation plans.
- Improvement of data quality.
- Optimization of internal data compilation processes.
- Reporting to recognized indices and ratings in each sphere of action.
- €4.138 Bn invested in environmental innovation projects.
- 308.34 Restored and maintained area (ha).
- 730.4 Protected area (ha).
- 61 Conservation plans.
- Establishment of goals consistent with the requirements applicable to our operations.
- Optimization of offsetting measures to reverse the impact on the surrounding environment.
- Conservation and restoration projects.
- 66% of innovation projects are sustainability-focused.
- €4.138 Bn invested in environmental innovation projects.
- Diversification of assets by both location and type.
- Technological tool to calculate the natural capital balance of our projects.
- Measures to minimize impacts on flora, fauna and habitats.
- 308.34 Restored and maintained area (ha).
- 0.13 Protected surface area affected (ha/€M).
- 61 Conservation plans.
- Transparency, truthfulness, immediacy, equality and symmetry in the dissemination of information.
- 1,101,441 m3 of drinking water intake prevented.
- Discharge quality.
- 14% desalinated water for agriculture.
- +9% increase in Concesiones Agua revenue vs. 2022.
- Commitment to nature protection and conservation, Service evaluation methodology.
- Technological tool to calculate the natural capital balance of our projects.
- Effluent pollutant measurement systems.
- +9% increase in Concesiones Agua revenue vs. 2022.
- 83.40% of activity certified to ISO 14001 standard.
- Dedicated Investor Relations Department.
- Conservation and restoration projects.
- Transparent internal and external communications in connection with our environmental operations.
- Partnerships and involvement in expert forums.

Physical risk
 Transition risks
 Canal del Dique. Colombia
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164 After carrying out our analysis of risks and opportunities linked to nature, we may conclude that in the vast majority of activities material regulatory and priority dependencies have been identified linked to land use change and biodiversity, specifically to the presence of protected habitats and species of conservation concern in the areas where we operate. No material dependencies were identified for the activities of urban development and water projects. Most of the risks identified are transitional, be they regulatory and financial, reporting or reputational. Some physical risks were also detected linked to the alteration of habitats and biodiversity; and dependencies on the use of resources and climate change, to which several activities are exposed. At present, we have mitigation and

management measures in place for more than 80% of those risks. Nature-related opportunities are linked to the implementation of nature-based solutions that mitigate and offset impacts, the transition towards more efficient technologies in the use of natural resources and a lower environmental impact, or fundraising for the development of nature conservation and restoration projects.

OPPORTUNITIES

Description KPI Resource efficiency Investment in nature-based solutions or lower-impact processes. • 66% of innovation projects are sustainability-focused. • €4.138 Bn invested in environmental innovation projects. • 10% increase in investment for environmental protection. • 78.34% Taxonomy-eligible CAPEX.

Products and services Transition to new technologies with less impact. • 66% of innovation projects are sustainability-focused. • €4.138 Bn invested in environmental innovation projects. • 78.34% Taxonomy-eligible CAPEX.

Market and financial opportunities Public and private incentives to implement conservation and restoration actions. • 66% of innovation projects are sustainability-focused. • €4.138 Bn invested in environmental innovation projects. • 61 Conservation plans. • 78.34% Taxonomy-eligible CAPEX.

Reputational Collaboration actions and management to improve the perception of the company. • 66% of innovation projects are sustainability-focused. • €4.138 Bn invested in environmental innovation projects. • 78.34% Taxonomy-eligible CAPEX.

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Management • Natural Capital Strategy and Climate Change Strategy. • Participation in specialized forums. • Supply chain engagement. • Development of innovation projects aimed at self-consumption. • Replacing vehicles that consume energy from fossil fuels with vehicles that run on renewable energy. • Construction of wind farms and solar thermal and photovoltaic plants. • Identification and assessment of nature-related risks and opportunities (TNFD). • Analysis of water-related risks. Identification and assessment of risks within the framework of ISO 14001 standard, annual monitoring. • Measurement and verification of European environmental footprint (transversal water, emissions and waste process). In-house training • Involvement in working groups and industry partnerships. • Establishing emissions reduction targets aligned with energy regulations and Sacyr's Climate Change Strategy. • Certifications (ISO 14001, ISO 50001 ISO 14064 and EMAS). • Maintaining biodiversity conservation targets in all contracts. • Natural Capital Strategy and Climate Change Strategy. • Participation in specialized forums. • Supply chain engagement. • Involvement in CDP

Water Security for the first time in 2023. • Definition of a water action plan, including setting goals, establishing lines of action, defining opportunities for improvement, and analyzing risks. • Development of environmental and energy management programs with performance improvement targets. • Setting a percentage reduction of Hazardous waste (HW), as well as goals and deadlines. • Promoting circularity in construction projects. • Criteria and requirements for procuring recycled and reused materials. • Implementation of Zero Waste certification. • Dissemination of Zero Waste Plan. • Design and dissemination of circular economy action guide.

Asio flammeus Integrated Sustainability Report - 2023

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6.4.1.4 Metrics and objectives

6.4.1.4.1 Protected areas [304-1] Sacyr's activities may be located within, affect sections of or be outside protected areas, requiring temporary or permanent land use. > Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas

Year	Total protected surface area (Km ²)	Surface area affected by activities including sections of the protected area (km ²)	Surface area affected by the activities inside it (km ²)
2021	10,116.44	8,596.03	15,083
2022	10,116.44	8,596.03	15,083
2023	10,116.44	8,596.03	15,083

Number of protected areas adjacent to our projects (No.)

Year	Number of protected areas adjacent to our projects (No.)
2021	15
2022	22
2023	27

This year, with respect to adjacent protected areas: 18 areas are located within 1 km and 9 areas are between 1 and 5 km of our projects. > Protected areas affected by activities

Year	Percentage	Surface area (km ²)
2021	0.10%	10.37
2022	0.06%	5.52
2023	0.04%	5.81

This year we have

identified a total of 49 protected areas¹ corresponding to 65 protection categories, where activities have been developed either inside, adjacent to them or in sections of the protected area. Most of these are land ecosystems, except in Valle del Cauca, Sucre and Bolívar (Colombia), the Algarve (Portugal), A Coruña, Alicante, Mérida, Girona, Palencia and Santa Cruz de Tenerife (Spain), which correspond to aquatic ecosystems. Mainly construction activities have been conducted in these locations, such as hydraulic works, dams, highways, roads, railway works and, occasionally, activities such as road and dam maintenance and the maintenance and operation of desalination plants. Protected areas¹ 30 39 49 Protective categories 33 48 65 2021 2022 2023 1 The same protected area may contain more than one different protection category (SCI, SCA, SPAB, etc.). *Thlypopsis ornata* 167 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices > Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas Protective categories Location of protected areas Special Conservation Area (SCA) 4 8 16 Spain: A Coruña, Gerona, Almería, Huelva, Jaén, Palencia, Cáceres, Mérida, Las Palmas and Santa Cruz de Tenerife. Special Protection Area for Birds (SPAB) 10 8 13 Spain: Gerona, Cáceres, Mérida, Badajoz, Jaén, Huelva and Santa Cruz de Tenerife. Site of Community Interest (SCI) 7 6 6 Spain: Alicante, Jaén and Zaragoza. Natural Park 2 5 5 Spain: Asturias, Jaén and Huelva. Portugal: Algarve. National Natural Park - - 3 Colombia: Sucre and Bolívar. Natural Monument - 3 3 Spain: Las Palmas and Santa Cruz de Tenerife. Special Protection Area (SPA) 1 3 3 Portugal: Évora and Algarve. Site of Community Importance (SCI) 1 2 3 Portugal: Évora and Algarve. Biosphere reserve 1 1 3 Spain: Cáceres and Huelva. National Protected Forest Reserves - - 2 Colombia: Valle del Cauca. Ramsar Site - 2 2 Portugal: Algarve. Important Bird and Biodiversity Conservation Area (IBA) 1 1 1 Portugal: Évora. Area of regional interest (ARI) 1 1 1 Spain: Cáceres. Nature Reserve - 1 1 Portugal: Algarve. Special Nature Reserve - 1 1 Spain: Santa Cruz de Tenerife. Land Conservation Districts - - 1 Colombia: Valle del Cauca. Regional Integrated Management Districts - - 1 Colombia: Valle del Cauca. Protected area for sustainable use of natural resources 1 1 - - Regional Natural Park 1 1 - - Ecological protection area 1 1 - - Wetlands of special interest 1 1 - - Urban Wetlands - 2 - - 2021 2022 2023 Integrated Sustainability Report - 2023 168 6.4.1.4.2 Protected species [304-4] In the course of our business we have carried out projects in areas with the presence of species included in the IUCN Red List and in national and regional lists. In 2023, activities have been carried out in the habitat of a total of 665 species², with the following degrees of protection: 9 critically endangered, 13 endangered, 44 vulnerable, 22 near threatened, 516 of least concern, 2 data deficient and 59 in other categories. Preventive measures have been adopted in all projects to minimize the impact on these species. These conservation and recovery plans are a priority in all our projects and are aimed at conserving existing flora and fauna and improve the populations of species and their habitats. We have built more than 50 wildlife crossings. > IUCN Red List 7.1% 3.5% 1.9% 1.5% 0.3% 85.7% Least concern (LC) Critically Endangered (CR) Data deficient (DD) Vulnerable (VU) Near threatened (NT) Endangered (EN) 2 Some species may be listed with different degrees of protection depending on where they live, but the IUCN Red List takes priority. *Coendou rufescens* 169 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Degree of protection Number of species IUCN Red List National lists Regional lists Location Critically Endangered (CR) 2 2 9 1 1 - - - Spain: A Coruña, Zaragoza, Vizcaya, Guipúzcoa, Las Palmas. Colombia: Nariño and Cartagena. Brazil: Rio Grande do Sul. Endangered (EN) 4 9 11 1 3 2 - - - Chile: Biobío, Valparaíso, Valdivia and Arica. Colombia: Cartagena and Nariño. Spain: Santa Cruz de Tenerife, Cáceres, Badajoz, Huelva and Vizcaya. Portugal: Algarve. Vulnerable (VU) 15 26 42 3 2 2

4 3 - Brazil: Santa Maria. Chile: Biobío, Valparaíso and Valdivia. Colombia: Nariño and Cartagena. Spain: Gerona, Asturias, Almería, A Coruña, Badajoz, Cáceres, Guipúzcoa, Las Palmas and Palencia. United States: Florida. Portugal: Évora and Algarve. Near threatened (NT) 25 18 21 1 1 1 - - - Chile: Cordillera and Biobío. Colombia: Nariño. Spain: Gerona, Huelva, Asturias, Zaragoza, A Coruña, Las Palmas, Vizcaya and Palencia. Portugal: Algarve. Least concern (LC) 358 322 508 2 3 8 - - - Colombia: Norte de Santander, Buenaventura-Loboguerrero-Buga and Nariño. Chile: Biobío, Copiapó, Valdivia, Cordillera, Arica and Colina. Brazil: Tabai, Veracruz and Río Grande do Sul. Paraguay: Caaguazú. Spain: Las Palmas, Gerona, Huelva, Alicante, Asturias, Cáceres, Badajoz, Guipúzcoa, Huesca, A Coruña, Vizcaya, Palencia, La Palma, Santa Cruz de Tenerife and Zaragoza. United States: Florida and Texas. Peru: Callao. Portugal: Évora and Algarve. Data deficient (DD) - - 2 - - - - - Colombia: Nariño. Other 2 - - 283 60 59 3 - - Colombia: Norte de Santander. Spain: La Palma, Las Palmas and Santa Cruz de Tenerife (Spain). > IUCN Red List species and national conservation list species with habitats in areas affected by operations 2021 2022 2023 2021 2022 2023 2021 2022 2023 Integrated Sustainability Report - 2023 170 • In the Autopista Al Mar 1 project (Colombia), we built 16 wildlife crossings. 5 of these were wildlife overpasses for animals like night monkeys, squirrels, honey bears, iguanas, and others. And another 11 were wildlife underpasses for foxes, dogs, ocelots, opossums, bush dogs, and others. The interventions include perimeter fencing at each of the sites, steering the animals to the wildlife crossings and preventing them from entering the road, as well as signs with information on the various species that use the corridor. We monitor the effectiveness and use of the crossings, and we have also placed camera traps at wildlife crossings. • In Unión Vial Camino del Pacífico (Colombia), we built 12 wildlife crossings. 11 of these were underpasses and 1 was an overpass, for the conservation and protection of wildlife in the Buenaventura-Loboguerrero-Buga road corridor. • In Northern Ireland, as part of the requirements of the A-6 Drumahoe to Dungiven Dualling highway project, 18 wildlife crossings were installed specifically for badgers and otters. The placement of the crossings for mammals was determined by ecological surveys and agreed by consensus with the Northern Ireland Environment Agency (NIEA). • In Rutas 2 and 7 (Paraguay) drainage culverts were adapted to make into wildlife crossings. Organic soil was spread on the embankment slopes and the banks of the watercourse, the embankments were planted and an enclosure was made to steer species to these wildlife crossings. • In Rodovia (Brazil) with the aim of reducing roadkill collisions involving tree-dwelling animals such as howler monkeys, hedgehogs and opossums, three wildlife overpasses (bridges placed in the treetops across the road) have been planned, approved by the environmental agency (FEPAM). • In Elorrio JV (Spain) stream crossings for fauna were made to ensure full permeability of species, although this project spans highly developed areas and the impact on fauna will never reach critical level. Linking ecosystems for wildlife Autopista al Mar. Colombia 171 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices The presence of invasive species can cause significant adverse ecological effects, such as reducing water availability, disrupting the balance of natural and seminatural ecosystems, and competing with native species, potentially displacing them entirely and ultimately leading to their extinction. EU Regulation 1143/2014 identifies the problem of invasive species, admitting it is a cross-border issue and outlining the need for coordinated actions. This regulation compiles a list of species of European interest and recommends measures focused on prevention, early detection and rapid eradication, as well as management of the species listed in the regulation. Thus, we control invasive species during the construction and operation of our projects and none of the work we do involves the introduction of invasive species. The following are some of our projects in which this invasive species control is carried out: New Velindre Cancer Centre At this cancer

hospital, we implemented an invasive species management plan, specifically for Japanese knotweed (*Reynoutria japonica* syn. *Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*). Both species will be eliminated, prevented from spreading, and any new shoots will be checked for every two years. A surface area of 15,244 m² of invasive species has been removed. Linha de Algarve In our project for the electrification of the Linha do Algarve railway section (Portugal), an Invasive Species Control and Management Plan is executed, mapping patches of invasive non-native species, analyzing the mapped areas and assessing the need to activate control or management measures. A surface area of 20,920 m² covered by invasive species has been removed and 243.32 tons have been properly managed as waste. Langosteira Outer Port Access Joint Venture The invasive species *Cortaderia Selloana*, widespread in the project area, has been controlled and eliminated. A surface area of 77,349 m² of invasive species has been removed. Sector Levant Joint Venture Sugar cane (*Arundo donax*) was removed through soil excavation, including removal of the rhizome, and it was disposed of as waste. 9,704 m³ of soil containing invasive species has been removed. Chira-Soria project We conducted survey and inventory of the distribution of invasive species in the Barranco de Arguineguín ravine, including *Austrocylindropuntia subulata* ssp. *Exaltata*, *Acacia farnesiana*, *Nicotiana glauca*, *Cenchrus orientalis* and *Arundo donax*. The next step are control measures and disposal in an authorized landfill. Lastly, the original plant communities are restored. A surface area of 132,419 m² covered by invasive species has been removed. Belfast Transport Hub An invasive species management plan has been implemented to limit the spread of such species on the ground, including Himalayan balsam and Japanese knotweed. Soil containing Japanese knotweed was excavated and moved to an authorized facility. 162.02 tons of soil containing Japanese knotweed were excavated.

Integrated Sustainability Report - 2023 172 6.4.1.4.3 Restoration and conservation of habitats We have planted almost 1,700,000 plants and trees in the last three years. [304-3] We are mindful of the disruptions that activities in the sector may cause to the natural environment, so we promote initiatives aimed at fostering the restoration and protection of the areas where we carry out our projects. Using the methodology we have developed for natural capital assessment, we are able to identify, in the design phase, those measures that have the most positive impact on the environment, thus helping to achieve a beneficial net balance. This advanced approach allows us to implement measures that are increasingly tailored to the specific features of areas and the ecosystemic services located in them. When a contract defines a restoration project, the guidelines are followed; and where there is no such project, specific restoration actions are analyzed and introduced. These compensatory measures are environmental restoration actions aimed at landscape integration, replanting of areas, restoration of areas temporarily occupied, etc. As a result of these actions, a total of 692,907 plantings were carried out, 96% of which were native species, and a total of 4,095 kg of seeds were sowed. Restoration activities are aimed at revitalizing deforested areas at high risk of desertification, eliminating erosion risks, protecting biodiversity and improving the soil's structure and organic matter. In 2023, a total of 308.34 hectares of the total area affected by the development of Sacyr's projects were restored. 25% of these actions have been verified by independent external professionals. In addition, a total of 730.4 hectares were protected through the necessary measures. In all cases, the results of the restoration and protection initiatives have been satisfactory.

Protected or restored habitats (Ha)

Location	2021	2022	2023
Algeria	2.03	–	–
Brazil	0.13	–	0.645
Chile*	–	5.63	24.48
Colombia*	371.43	1,208.16	946.50
Spain*	66.49	149.55	32.08
Northern Ireland	214.57	–	–
Paraguay	–	9.87	34.09
Peru	–	6.73	–
Uruguay	–	0.35	0.94
Total restored area (Ha)	368.51	809.94	308.34
Total protected area (Ha)	286.15	570.37	730.40

* In 2023, Spain carried out protection and restoration actions in 6 ha and 26.08 ha, respectively. Chile carried out protection and restoration actions in 24.45 ha and 0.032 ha, respectively, and Colombia carried out protection and restoration

actions in 699.95 ha and 246.55 ha, respectively. 173 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

In the construction of the WP3 EPC New Terminal, Platform and Access at Jorge Chávez International Airport (Peru), archaeological material has been preserved and recovered. As part of this commitment, in February 2023 the "La Cultura nos Une" (Culture Unites Us) event took place. At the event, representative samples of cultural materials recovered in compliance with the Archaeological Monitoring Plan, in collaboration with our client LAP - Lima Airport Partners, were displayed. This event received widespread media coverage and was attended by the Culture Minister, Lic. Leslie Urteaga Peña. To date, we have recovered more than 13,000 pieces of cultural evidence, including fragments of ceramic jars with seals of the Jesuit order (IHS), 17th century tiles, stone mortars, fragments of colonial and republican pottery featuring designs, as well as contemporary materials from industrial archeology, such as miniature bottles and glass vials, among others. Cultural and archaeological heritage

Landscape restoration Ancestral treasures under the skies of Lima In the Ruta 2 rehabilitation and expansion project (Paraguay), the landscape will be restored in areas near the site maintenance sheds to benefit native fauna and flora, specifically for endangered species such as the hummingbird, jatei (native honey bee) and birds in general. The adequate native forest and ornamental species are being used. A local biodiversity friendly space has been created, ramping up pollinator interaction by 30% and slashing water use by 90%. In the Ruta del Algarrobo highway project (Chile), a series of initiatives have been implemented to revitalize flora and restore cultural infrastructure. Incahuasi village now has new green areas that, in addition to improving the aesthetic appearance of accesses to the town and the area surrounding the P3 site, benefit the environment. Also, the bus stops in the area have been refurbished and now feature mosaics depicting species of regional fauna, and a distinctive local chapel, which is considered a cultural heritage site, has been restored. We respect and protect the valuable cultural, archaeological and paleontological heritage of the communities that live near our operations. Before commencing a project, we follow the archaeological procedures required by applicable regulations. Our aim is to recover and catalog any finds in the work area. We devoted more than 7,500 hours to raising awareness, with the aim of pressing upon every link in our value chain the importance of preserving historical heritage. Any finds made during the works are transferred to national museums or recognized institutions so that they can be enjoyed by people in the local communities. Our dedication to caring for the artistic and cultural environment allows us to recover valuable heritage for the benefit of the community. Find out more in this video

Integrated Sustainability Report - 2023 174 Relocation of popular religious resources Recovering history in Spain From Cambridge to Nariño In the Ruta 66 – Camino de la Fruta P3 project (Chile) it was necessary to relocate Popular Religious Resources affected by the works. It was ensured that their relocation was as close as possible to existing one, and also that they did not interfere with the execution of the works. Furthermore, one of the requirements for the new location was that it provided safe access to families so as to preserve religious practices, rites and beliefs, deployed around the cenotaphs, forming an integral part of the road's landscape and ensuring the safety of the families who continually visit the site. A dissemination plan was implemented to inform families through the main local radio stations, digital platforms such as WhatsApp and Facebook, and others. Community meetings were also held in order to broaden the scope of dissemination to establish contact with them. In the Almodévar reservoir construction works to regulate irrigation in the Alto Aragón region (Huesca), we have recovered and moved, rock by rock, the original remains of the southern wall of the Ermita de Santo Domingo church, dating back to the end of the Middle Ages (7th-8th century). In the Ibiza WWTP works, the following finds were uncovered:

- A Roman road.
- A 16th century irrigation channel.
- A

Roman aqueduct. • A Phoenician archaeological site of considerable heritage interest, including wall structures, a hydraulic structure, amphorae and a well. These archaeological remains required three pile-drives with archaeological supervision to conserve the finds. To preserve the Roman road, the original route of the project was diverted. Kate Klesner, a postdoctoral student in archeology at the University of Cambridge (UK), and two local students, are carrying out archaeological research in the Rumichaca Pasto project (Nariño Department, Colombia). Concesionaria Vial Unión del Sur's preventive archeology program has served as a nexus of knowledge between students and faculty from various universities in Colombia and as a source of information about human groups that lived in the Rumichaca-Pasto corridor in the past. To learn more, check out this video [Almudévar reservoir](#).

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6.4.1.4 Environmental pollution [3-3] At Sacyr we are committed to preventing and controlling all kinds of pollution during the course of our activities, as enshrined in our Quality, Environment and Energy Management Policy. To fulfill our goals, we have launched a pilot project to assess the Environmental Footprint of the organization's activities (OEF) based on data from 2023. This is a multicriteria measure of our environmental performance from a life cycle perspective. The pilot project covers our activities' direct and indirect environmental footprint, gauging the environmental impact categories established by the European Commission through Recommendation (EU) 2021/2279. To obtain the environmental impact categories established by the benchmark regulation, we used Environmental Footprint 3.1 (adapted) V1.00 / EF 3.1 normalization and weighting set methodology. The purpose of this analysis is to ascertain the impacts on the environment relating to our activities, to serve as a tool for decision making and to make the results available to stakeholders with the aim of conveying the importance of our environment-related commitments for Sacyr. For the direct Environmental Footprint, we have analyzed water consumption and discharge and emissions associated with the activities. For the indirect Environmental Footprint, we analyzed the generation of energy consumed, the production of materials and fuels used, the manufacture of chemical products, waste management and the transportation of fuels, materials and chemical products as well as the transportation of waste to the manager.

Air pollution [305-6] [305-7] At Sacyr's facilities, the substances that affect the ozone layer are found in the air conditioning units, which are maintained in accordance with existing legislation. In addition, the operation of this equipment is closely monitored to minimize the chances of leakage. This year, as in 2022, Sacyr emitted no CFC11 (trichlorofluoromethane). Emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC) and particulate matter are generated by electricity and fuel consumption.

> Emissions of nitrogen oxide (NO_x), sulfur oxides (SO_x) and other significant emissions into the air* Fuels

	2021	2022	2023
SO ₂ (t)	1,023.10	1,007.82	256.83
NO _x (t)	695.72	699.87	476.94
CO (t)	98.04	119.54	263.09
NMVOC (t)	32.04	36.99	270.35
Particulates (t)	400.27	393.14	256.79

Electricity

	2021	2022	2023
SO ₂ (t)	1,023.10	1,007.82	442.80
NO _x (t)	695.72	699.87	405.77
CO (t)	98.04	119.54	125.17
NMVOC (t)	32.04	36.99	173.89
Particulates (t)	400.27	393.14	199.26

2021 2022 2023 * Results based on Ecoinvent emission factors. 1 Vehicles, machinery and plant.

Integrated Sustainability Report - 2023 176 Our Quality, Environment and Energy Management Policy sets out our commitment to reducing atmospheric emissions of both greenhouse gases and other polluting gases such as NO_x, SO₂, CO, COV and particulates. Furthermore, we adopt a series of measures aimed at minimizing and avoiding this type of emissions, which correspond to energy efficiency actions and reducing fossil fuel consumption as provided in our Climate Change Strategy, linked to lighting, renewable electricity generation and the renewal of vehicles, investing in innovation and technology as the

cornerstone to achieving a fleet of hybrid and electric vehicles. Water pollution Most of our activities generate liquid effluents, which are wastewater not consumed or otherwise incorporated into our assets. This water leaves our facilities in keeping with the discharge authorizations in force. At Sacyr, we ensure that the quality of discharges is maintained at all times. We have on-site treatment plants and water quality control systems to ensure that discharges meet the required standards and are compliant with environmental legislation in force. These processes are part of our environmental management systems, which are certified to international standard ISO 14001. All Sacyr's actions to combat water pollution are outlined in section 6.4.2. Sustainable water management. Soil pollution [306-3] [CRE-5] Sacyr's Integrated Management System has adequate systematics in place to identify, prevent and respond to possible incidents, accidents or potential emergency situations that may have an impact on the environment. Furthermore, all projects are subject to rigorous operational control through inspections that prevent the impact of a potential spillage of hazardous substances. Thus, incidents of this type occur infrequently and do not have serious consequences. In 2023, there were no significant spillages, i.e. none whose scale went beyond the control of our contracts, required external means for their control or disrupted normal contractual activity. However, we did detect a number of small spillages on the ground which, in all cases, were satisfactorily resolved by cleaning the affected area and adequately managing the waste generated. None of these spillages led to soil contamination. However, we did carry out projects in locations where we encountered soils previously contaminated by third parties and where no remediation activities had been carried out. In any event, all such incidents were appropriately managed according to their nature. Contaminated soil where remediation activity has been carried out (sqm) 0 0 0 Contaminated soil where no remediation activity has been carried out (sqm) 69,992.98 59,613.20 179,046 Potentially contaminated soil where the degree of contamination has not yet been measured (m²) 0 0 28,000 2021 2022 2023 177

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Appendices Noise pollution At Sacyr, we conduct operations that may make noise and cause vibrations. In all our contracts, we carry out measurements to assess the noise and vibration impact and, if necessary, implement mitigation measures in strict compliance with current legislation and regulations. Below we highlight some of our initiatives to reduce noise pollution:

- Taking noise measurements during the preoperational phase of the project to establish baselines to determine the potential impact that the work could have, always with strict regard to current legislation.
- Compliance with preventive maintenance programs for machinery in order to guarantee optimum operation and achieve a reduction in the noise generated.
- Carrying out awareness campaigns for project staff.
- Installing temporary and/or permanent noise barriers.
- Compiling reports to monitor species in the work areas.
- Reducing the speed of vehicle traffic.
- Carrying out the work that generates the most noise at specific times of day so as to minimize the impact on the neighboring population and wildlife.
- Noise mitigation around nesting areas or in areas that might otherwise impact birdlife.
- Halting work during the breeding period of fauna.

Measurement Prevention Reduction These measures are periodically monitored to ensure they are properly implemented in conformity with the environmental impact statements and in coordination with the relevant environmental bodies. Light pollution Light pollution is the alteration of natural darkness at night, caused by wasted, unnecessary or inappropriate outdoor lighting, which has an impact on people's health and lives. In projects where an environmental impact is identified, we develop initiatives aimed at optimizing the use of energy resources, thus helping to reduce light pollution. These mitigation measures include proper maintenance of light fixtures to ensure they work properly and orienting lighting towards the work area, avoiding its being dispersed upwards. We ensure that lighting levels comply with

regulations in force and we have established procedures to dim or switch off lights where possible. Additionally, at Sacyr we have gone one step further, implementing our own technology in light sources to minimize light pollution and promote energy efficiency. We have patented and developed our IOHNIC system using LED technology that expands the light beam without the use of lenses, thereby avoiding efficiency losses. We use LEDs with a neutral color temperature of 4000K and a high color rendering index (CRI) of over 80 to improve visual perception and comfort. All the lighting fixtures are managed using the DALI protocol for gradually lighting and dimming areas according to their occupancy.

Odor pollution When it comes to odors and emissions, Sacyr Water has an air quality monitoring program at its facilities, which maps the properties of emissions, as well as conducting periodic checks and issuing recommendations to minimize diffuse emissions. In 2023 we carried out a total of 825 olfactometric measurements at 275 monitoring points located across 7 centers, including between urban and industrial wastewater treatment plants. Accordingly, we are able to keep diffuse emissions low and, in the facilities' area of influence, below 5 uoE/m³ percentile 98. In 2023, we have not received any incident, complaint or claim in connection with water, soil, light or acoustic pollution in any of our projects. There has been one recorded incident in connection with odors, which is currently in the process of being resolved, and two noncompliances in connection with air pollution due to not having taken the environmental mitigation measures against airborne dust particles. One of these was resolved in the year and the other is being processed.

Integrated Sustainability Report - 2023 178 6.4.2 Sustainable water management [3-3] [303-1]

In 2023, according to the report published by the United Nations (UN) at the World Water Conference, 26% of people worldwide do not have access to safe drinking water. Population growth, climate change and increased demand for water from industry, agriculture and households have exacerbated water availability and quality issues. Populations that do have drinking water experience periods of scarcity and nations' water resource management plans must be able to respond to these needs. The UN estimates that the urban population experiencing water scarcity will reach 2.4 billion people by 2050. At Sacyr, we are committed to continuous improvement in water resource management and we have set a goal to achieve this: to reduce own water consumption across all our activities by at least 10% by 2025, in areas of both high and low water stress. Furthermore, by means of the Environmental Management System implemented according to ISO 14001 we set targets for water consumption reduction, discharge quality improvement and reduction of water loss due to leaks in the supply to communities. These measures reduce our impact on water availability and quality. Within this framework, we have identified and assessed the water-related risks and opportunities associated with our activities, which are described in greater detail in section 6.4.1.3 Management of risks and opportunities of this report.

Assessment Reduction Governance Metrics In this section we outline our water management actions in four key phases: CDP awarded us a double "A" score CDP awarded us a double "A" score for our work against climate change and for water protection and safety. We are committed to continuous improvement in our management of water resources. Our water treatment and production activities mean we have a very positive impact, improving water quality and providing fresh water in areas of very high water stress.

179 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.4.2.1 Impact assessment Based on our processes and fostering the rational and sustainable use of this resource, we measure our water footprint to ascertain, identify and assess our potential impacts in connection with fresh water and sea water. Our water footprint encompasses all aspects relating to the natural environment, human health and water resources. This assessment is carried out in accordance with ISO 14046 "Environmental Management".

Water footprint. Principles, requirements and

guidelines". In 2023, we renewed our water footprint verification certification covering all our activities globally, providing details of all water capture, discharge and consumption per facility. In this assessment, we took into account both the direct and indirect water footprint, i.e. that of the value chain. In this analysis, we used various methodologies and selected the most suitable impact categories for our activities, examining the effects on water availability, human health and ecosystems. We used the following impact assessment methodologies and impact categories: Hoekstra et al. 2012 (Water Scarcity Indicator, WSI) V.1.04 LC-IMPACT, average preference, all impacts, 100 years V1.02 • Acidification • Freshwater eutrophication • Seawater eutrophication • Use of water • Water scarcity indicator • Water resources. • Water pollutants: - Persistent organic pollutants in the water. - Heavy metals in the water. - Radioactive substances in the water. • Human health-related: - Water stress (human health). • Linked to aquatic ecosystems: - Climate change. - Freshwater eutrophication. - Seawater eutrophication. - Water stress (ecosystems). • Linked to aquatic ecotoxicity: - Freshwater ecotoxicity. - Seawater ecotoxicity. Environmental Footprint 1 3.1 (adapted) V1.00 3 2 Ecological Scarcity 2021 V1.0 4 Once again, the results of the audit were excellent, given the complexity of the project due to the high turnover and considerable variety of activities. For the second consecutive year, we are the first infrastructure company to certify its water footprint to AENOR ISO 14046 standard. Integrated Sustainability Report - 2023 180 Thanks to our treatment and production activities we have a very positive impact. On the one hand, our wastewater treatment activities considerably improve water quality parameters, generating a positive impact, and the desalination facilities managed by Sacyr Water provide fresh water in areas with very high water stress. Furthermore, through the Environmental Management System implemented according to ISO 14001 we identified and assessed the aspects associated with our activity, pinpointing potential environmental impacts, establishing an operational control framework for their proper management and monitoring.

6.4.2.2 Reduction measures The use of water in the execution of our activities is indispensable and inevitable, as in any activity that involves the production of goods and services, However, it is no less crucial to optimize its use and guarantee its quality. For this purpose we carry out multiple actions to keep evolving in our commitment to reduce impacts on fresh water and sea water. There follows a list of initiatives that we are implementing in various projects to reduce, reuse or prevent the pollution of this precious resource: Efficiency improvement In our Integrated Water Cycle projects in Chile we have established a plan to enhance supply network performance in 2021-2030, which involves investing in integrated network management projects (network sectorization, pressure management using regulatory valves, detection and repair of leaks and installation of flowmeters in ponds and replacement of meters). These measures will reduce network leaks by up to 7%, implying a saving of 1.4 million m³ of fresh water per year. The investment in 2023 to implement this measure amounted to €66,298.50. We reuse • In our wastewater treatment plants in Yecla and Jumilla (Spain) more than 3,500,000 m³ of water is reclaimed per year for agricultural use. The volume of water supplied by both treatment plants accounts for between 30% and 50% of the total used by local irrigation communities. The water used in this area comes mainly from wells, and this measure avoids ground water capture and thereby expands the area of cultivable land. In addition, the water reclaimed from these treatment plants has a high phosphorus and potassium content and low nitrogen content, which makes it ideal for use in soil and for crops, as these compounds do not have to be added in fertilizers. To complete this measurement of water reuse, an investment of €142,019.22 was made in 2023. • In the Ruta del Algarrobo highway project (Chile) two wastewater treatment plants were installed for reusing water on site. These two plants treat a combined total of 80 m³ of water per month, of which 30% will be used in irrigation. To obtain this measurement of water reuse, an investment of €5,454.91 was made in 2023. > 2022 Water Stress Index (WSI) Direct water

footprint Indirect water footprint 0 (million m³) -284.506 14,668 181 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

Similarly, through our unit Sacyr Water, we continue to provide society with the best and most innovative technologies for the supply of fresh water through desalination, enabling used water to be treated and reclaimed for new purposes, or to be returned to nature in optimal conditions. At present, Sacyr Water manages ten desalination facilities, all located in areas of high or extremely high water stress that need these facilities to meet their annual drinking water needs, supplying drinking water to more than 6 million people. Note also that most of our desalination plants use certified renewable energy. We prevent pollution

- To build the Belfast Transport Hub (Belfast, UK) a water treatment plant was installed to reduce the amount of suspended solids and control pH prior to discharge into the Belfast sewer system. To ensure the quality of the water, water samples are sent monthly to a laboratory for analysis. This water has a pH of approximately 11 before treatment and a pH of 7 after treatment. The results evidence the effectiveness of treatment systems in neutralizing pH levels and reducing the suspended solids content prior to water discharge. The investment in 2023 to implement this measure amounted to €13,126.86.
- Life HyReward installed in the IDAM Alicante desalination plant (Spain) uses brine from the reverse osmosis processes in sea water desalination as a high salinity feed stream and treated waste water as a low salinity feed stream. The combination of the two by means of reverse electrodialysis (RED) allows electrochemical energy to be converted into electricity, thereby generating renewable blue energy. Life HyReward (LIFE20 CCA/ES/001783) is financed by the European LIFE program and, in addition to generating and storing electrical energy, the aim is to reuse the water stream with a high salt concentration whose final destination is the sea and to tap into this process to dilute the brine before discharging it, a process that is always necessary in any case so as not to damage marine ecosystems. This project required an investment of €162,221.07 in 2023. We use rainwater For garden irrigation, we use the water stored in the protection layer of the desalinated water reservoir in the Carboneras V pumping project in Almeria (Spain), harvested using a rainwater collection system. The system consists of a pump and pipeline that channels the stored water into a 200 m³ reservoir. Thanks to this system, in 2023 approximately 3,000 m³ of rainwater was used to water gardens in areas of extremely high water stress. Furthermore, in our construction contracts we have used around 1,500 m³ of rainwater in 2023 for soil compaction, road irrigation and filling of Jersey barriers, among other construction applications.

Integrated Sustainability Report - 2023 182 6.4.2.3 Governance and joint water management Our commitment to prevent water pollution is enshrined in our Quality, Environment and Energy Policy. We also have a Water Policy aimed at all our stakeholders and approved by the Board of Directors, which establishes the criteria and principles to make efficient use of water resources, especially in areas of high water stress, aimed at minimizing the impacts on fresh water and sea water. Our Supply Chain Management Policy extends our commitments, policies and values to include our entire value chain. Moreover, in order to improve water management in our supply chain, we have strengthened our purchasing and subcontracting procedure in terms of the information required on our suppliers' efficient water management, such as the calculation and certification of their water footprint, implementation of plans to reduce water consumption and best practices to minimize it, measures to minimize waste and contribute to the circular economy, availability of an environmental label and, at the same time, we examine whether the distance to the contract is less than 100 km. Thus, we aim to encourage our value chain to assess its water impacts. In section 6.4.1.1 Governance, at the beginning of this chapter, we developed the roles of each of the company's governing bodies and their competencies in the supervision and performance with respect to water resources. In

our water management we must take a collaborative approach that takes into account the needs and interests of the various stakeholders with whom we interact. With this purpose in mind, we expanded our efforts in collaboration with public and private bodies to guarantee the availability and quality of water to future generations. Some examples of collaboration with stakeholders are: Perth Desalination Plant. Australia 183 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices We foster the development of public policy in order to offer effective solutions for the consequences associated with water scarcity. • We support associations like AEDyR (Asociación Española de Desalación y Reutilización), AEAS (Asociación Española de Abastecimiento y Saneamiento) and CEOE in Spain, where Sacyr has representatives, as well as international associations like IDA (International Desalination Association), ALADyR (Asociación Latinoamericana de Desalación y Reuso) and ACADES (Asociación Chilena de Desalación y Reuso). • We are asked by public bodies to provide our specialist expertise on various pieces of draft legislation. • At AEDyR we have worked and continue to work with the Spanish Health Ministry to approve a new regulation on drinking water, adapting the European regulation on wastewater reuse in agriculture, and the European Green Taxonomy. • At Sacyr we take an active role in promoting initiatives like Water Positive, to boost efficiency in water use in industry and the use of nonconventional methods (desalination and reuse) to combat drought and climate change. • We took part in the United Nations Climate Change Conference (COP 28) in a panel discussion on innovation in the use of desalinated water to produce crops. This panel presented innovation in the water-energy-food ecosystem (WEFE) focusing on desalination as a water resource with a zero liquid discharge system combined with renewable energies to maximize crop production while minimizing water consumption. • We belong to associations like AEDyR, IDA, the Water Technology Committee of SEOPAN, IMDEA (Instituto Madrileño de Estudios Avanzados-Agua), AEAS, IMDEA AGUA, SEOPAN and CEOE (on the Committee for Water and Coastal Protection) in Spain, and ALADyR and ACADES internationally. • We have signed up to the Territorial Water Efficiency Agreement (APL), the first water efficiency agreement in Chile. This is a voluntary public-private commitment aimed at tackling water scarcity and the challenges of climate change in one of the communes at the highest risk for water rationing in Lo Barnechea in the Metropolitan Region. Lo Barnechea is the commune with the highest water consumption in Chile, so we strive tirelessly to raise awareness and disseminate knowledge and educational material among the local residents. • We train staff specializing in desalination and water reuse through courses and masters in Water Management and Treatment promoted by the University of Alicante and the University of Alcalá in Spain, and through the online University Specialist in Desalination and Reuse course offered by the University of Alicante or the Desalination Training Course run annually by ALADyR in Alicante, in partnership with the University of Alicante and AEDyR. • We raise awareness among the population of Santa Cruz de Tenerife, through EMMASA. We launch watersaving drives, ensuring water availability and preventing water wastage for more than 200,000 people. • We have developed a personal water footprint calculator, that will be added to the website and applications for contracts and subscriptions so that our customers, subscribers, collaborators and employees can estimate the impact of their water consumption in the form of a water footprint to make them mindful of that consumption and foster actions to reduce it. We support the development of public policy We foster collective action We encourage community engagement • We take part in congresses and conferences, notably including the United Nations Water Conference, the AEDyR (Asociación Española de Desalación y Reutilización) International Conference, the EDS (European Desalination Society) Congress, the National Water Congress, IDA Water and Climate Change Summit, organized by the International Desalination Association and the ALADyR Congress

(Asociación Latinoamericana de Desalación y Reúso). • We organize innovation forums and technical forums as part of our main contracts to promote knowledge management and the implementation of innovative technologies to address water treatment challenges (pollution, circular economy, energy efficiency and use of renewables, digital transformation, etc.). • We foster the development of new technologies and processes by external innovators through challenge programs such as Sacyr iChallenges, in which this year the challenge was early detection of contaminants of emerging concern and microplastics. Integrated Sustainability Report - 2023 184

In addition, we have formal dialog mechanisms in place with our stakeholders to receive queries, claims and/or complaints through the Regulatory Compliance communication channels. To learn more about the channels for queries and resolution of claims, see the Quality for our customers section in this Report. Water stress is measured using the Aqueduct Water Risk Atlas, a public tool from the World Resources Institute, following GRI (Global Reporting Initiative) standards. According to this tool, water stress areas are considered to be those with associated "high" (40- 80%) or "extremely high" (> 80%) benchmark stress.

> Water withdrawal for self-consumption in water-stressed areas (ML)

Type of source	2021	2022	2023
Surface water	337.63	671.46	225.07
Ground water	141.57	138.82	265.34
Sea water	21.10	32.04	44.30
Water from third parties	3,414.00	2,923.81	1,516.21
Total	3,914.30	3,766.13	2,050.91

The tables do not include water withdrawal in 2021, 2022 and 2023 due to the non-existence of said withdrawal in the reporting period. The entire volume of water withdrawal from sea water belongs to the "other water (total dissolved solids >1000 mg/l)" category. The remainder of the volume of water withdrawal belongs to the "fresh water (≤1,000 mg/l)" category. *1 ML is equal to 1,000 m3 . 59.56% of our centers are located in areas of high or extremely high water stress where rainy days are infrequent. In these areas reusing water in own activities or using alternative water sources such as reclaimed water is encouraged, as explained below.

6.4.2.4 Metrics

6.4.2.4.1 Water uses

At Sacyr, we manage water in the context of our operations: as water for internal use and as water to supply the community. Firstly, we use water internally in our facilities to support a wide range of activities. This includes surface and groundwater collection, as well as the supply of water from third parties, mainly from municipal sources. We also harness water sources that do not compromise the availability of this resource, such as reclaimed water from main supply networks and water reclaimed or reused on site. [303-3]

> Water withdrawal for own consumption (ML)

Type of source	2021	2022	2023
Surface water	603.48	869.61	455.31
Ground water	141.57	216.38	277.92
Sea water	21.10	32.04	44.30
Water from third parties	3,669.65	3,271.09	1,715.76
Total	4,435.80	4,389.11	2,493.29

The tables do not include water withdrawal in 2021, 2022 and 2023 due to the non-existence of said withdrawal in the reporting period. The entire volume of water withdrawal from sea water belongs to the "other water (total dissolved solids >1000 mg/l)" category. The remainder of the volume of water withdrawal belongs to the "fresh water (≤1,000 mg/l)" category. *1 ML is equal to 1,000 m3 .

> Water withdrawal by source

Source	2021	2022	2023
Water from third parties	68.82%	18.26%	11.15%
Ground water	1.78%	1.78%	1.78%
Surface water	18.5%	80.7%	86.4%
Sea water	11.15%	1.78%	1.78%

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Water storage is not a common practice in our activities. In our integral water cycles we have the necessary regulating reservoirs to guarantee the water supply at all times. The water in our regulating reservoirs is stored for the shortest possible time in order to prevent its degradation and it varies in accordance with water demand depending on the time of the year. We calculate own water consumption as the difference between total water withdrawal for own consumption and total water discharge, in accordance with GRI standard

> Water withdrawal from third parties for own consumption (ML)

Type of source	2021	2022	2023
Drinking water from third parties	2,943.37	2,413.69	614.32
Reclaimed			

water from third parties 726.29 857.40 1,101.44 Total 3,669.65 3,271.09 1,715.76 2021 2022 2023 *1 MI is equal to 1,000 m3 . In all our projects and facilities we promote the consumption of recycled or reused water, both internally in our facilities and projects and externally, fostering the use of alternative water sources to preserve available natural reserves. In 2023, recycled or reused water accounted for 44.18% of total extracted water for our own consumption. > Reclaimed water (ML) Total 726.29 857.40 1,101.44 2021 2022 2023 *1 MI is equal to 1,000 m3 . In 2023, we avoided the capture of 1,101,441 m3 of drinking water by prioritizing the use of reclaimed water. guidelines. All the data used for the calculation were obtained from invoices showing consumption and the monitoring and control data for the company's facilities, contracts and services. In most cases, we work with specific company data, while in others we work with data obtained from calculations based on specific primary data from the company itself. [303-5] > Own water consumption (ML) Type of source Water consumption 3,737.77 3,636.90 1,134.19 Water consumption in waterstressed areas 3,294.20 3,167.34 811.80 2021 2022 2023 *1 MI is equal to 1,000 m3 . In order to reflect our performance in respect of water resources, in addition to the absolute water consumption values, we calculate relative values per million euros of revenues. > Water intensity Turnover (€M) 4,675.37 5,851.72 4,609.43 Water consumption (m3) 3,737,770 3,636,900 1,134,188 Water intensity (m3/€M) 799.46 621.51 246.06 2021 2022 2023 Furthermore, through Sacyr Water, we supply drinking water to communities within the framework of our contracts. This means capturing water to meet the needs of third parties. Sacyr Water focuses on operation and maintenance of various facilities, such as drinking water treatment plants, treatment plants, desalination plants and water treatment and reuse systems, as well as in the integrated water cycle, under public concession or private initiative. The common denominator is that this water is treated to obtain quality standards suitable for human consumption or to established purification levels. Through Sacyr Water, we optimize water resources by producing fresh water through desalination, minimizing losses as water is distributed, and enabling used water to be treated and reclaimed for new purposes or to be returned to nature in optimal conditions. Technology enables us to supply people with the water they need, of a quality suited to each use, minimizing the generation of waste and pollutants. Integrated Sustainability Report - 2023 186 > Water use for populations (ML) Supply use: distribution of water from discharge network. 42,175.61 33,604.79 33,992.68 Supply use: distribution of water for irrigation (drinking water, surface water or groundwater). 21,876.64 34,686.89 29,196.37 Supply use: distribution of water from surface water or groundwater sources. 80,185.83 82,521.02 77,232.96 Supply use: number of regulating reservoirs. – – 100 Supply use: storage capacity of regulating reservoirs. – – 2,491.05 Purification: use of reclaimed water. 10,589.32 13,700.81 13,770.17 Purification: use of treated sea water. 28,133.09 24,884.42 24,056.08 Purification: use of treated surface water. 66,851.83 68,891.23 107,576.70 Desalination: use of desalinated water for supply. 140,213.90 172,458.52 174,255.93 Desalination: use of desalinated water for irrigation. 30,412.33 27,802.07 28,770.17 2021 2022 2023 > Water use for populations in water-stressed areas (ML) Supply use: distribution of water from discharge network. 40,103.55 32,593.96 25,583.84 Distribution use: water for irrigation (drinking water, surface water or groundwater). 21,876.64 34,686.89 27,779.35 Supply use: distribution of water from surface water or groundwater sources. 22,026.94 21,063.49 23,185.15 Supply use: number of regulating reservoirs. – – 51 Supply use: storage capacity of regulating reservoirs. – – 2,136.72 Purification: use of reclaimed water. 8,988.37 11,902.54 4,683.69 Purification: use of treated sea water. 10,884.18 10,009.44 882.55 Purification: use of treated surface water. 62,487.12 65,095.35 62,148.28 Desalination: use of desalinated water for supply. 86,507.81 96,843.19 92,073.70 Desalination: use of desalinated water for irrigation. 30,412.33 27,802.07 28,770.13 2021 2022 2023 The entire volume of desalinated water for supply belongs to the category of "other water (>1,000 mg/l)". The rest of the

volumes for supply are comprised of fresh water. 1 ML is equal to 1,000 m³. Canal del Dique. Colombia

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Water treatment and distribution for customers Supply Municipal Surface water Reclaimed water Purifying Purification Sea Agriculture Municipal Discharge network Sewerage network Surface water Ground water Sea Desalination Sea Drinking water To purification To agriculture Sea water Purified Rejection water (brine) SOURCE PROCEDURE PURPOSE

At Sacyr we cater to the needs of millions of people around the world as we respond to one of the greatest environmental challenges facing humanity: access to water and sanitation. 140,422.01 ML of water was captured in plant operation for treatment and distribution to the population, of which 76,548.37 ML in water-stressed areas. We are acutely aware of the importance of taking care of our water resources and are concerned about efficiently managing its integral cycle. We therefore operate reclaimed water production facilities and specific networks for supplying water to irrigate green areas, wash down streets or for industrial purposes. Thanks to these activities, we have succeeded in reducing the consumption of drinking water, despite the increase in population and economic activities. In 2023, the water reclaimed and distributed by Sacyr amounted to 13,770.17 ML, of which 34% is reclaimed in areas of extremely high water stress. This avoids the capture of 4,683.69 ML in these areas from conventional fresh water sources. We also bring our technology to bear to obtain water for agricultural irrigation based on desalination, which is particularly important in areas with water scarcity. Use of this technology in recent years has yielded good results and complements other water resources to guarantee the future of agricultural irrigation. By implementing efficiency techniques, we were able to purpose 14% of the water generated in desalination plants to agriculture in areas of acute water scarcity.

Integrated Sustainability Report - 2023 188 To carry out our activity, we have the water capture permits issued by the competent authorities in each country, which are drawn up in accordance with the ecological thresholds established. These permits establish the permitted capture volumes, ensuring that water capture does not undermine the needs of the population and related habitats. In all our projects, we implement an Environmental Management System that closely monitors operations to guarantee compliance with the requirements provided in the permits and thereby guarantee ecological thresholds.

6.4.2.4.2 Effluents and discharges [303-1] [303-2] Most of our activities generate liquid effluents, which are wastewater not consumed or otherwise incorporated into our assets¹. This water always leaves our facilities in keeping with the discharge authorizations in force. At Sacyr, we ensure that the quality of discharges is maintained at all times. We have on-site treatment plants and water quality control systems to ensure that discharges meet the required standards and are compliant with environmental legislation in force. These processes are part of our environmental management systems, which are certified to international standard ISO 14001. Water arriving at our treatment plants is treated and returned to watercourses or the sea, or reused after being reclaimed. We always keep discharge quality within the limits set by environmental legislation and discharge permits, which are based on ecological thresholds determined by the competent authorities. To ensure the quality of the water and compliance with the ecological thresholds, we continuously monitor the quality of discharges in accordance with the environmental monitoring plans established in the relevant permits. Furthermore, we periodically report water quality parameters to the relevant environmental authority, which in turn carries out constant supervision to ensure compliance with the conditions established in the permits. Brine is also discharged in accordance with its authorizations and with the project's environmental impact statements, which generally include prior dilution, discharge through diffusers for rapid mixing and rigorous environmental tracking to ensure there are no significant impacts on the marine environment.

We promote research into pollution prevention through projects like SOS-AGUA-XXI. In this initiative, research lines are tasked with detecting, treating and eliminating contaminants of emerging concern (CECs), through lab studies and the implementation of various pilot plants equipped with different technologies (membranes, active carbon, advanced oxidation, etc.) at the wastewater treatment plant at Yecla (Murcia).

1 Our activities do not form part of industrial processes, so no priority substances as defined by Directive 2000/60/EC are detected in our discharges. Domingo Zarzo, Director of Innovation at Sacyr Agua, taking part in a panel discussion at COP28 189 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices

We also have emergency plans and protocols available to provide a proper and rapid response in the event that a discharge or spillage affects the external environment, including:

- Transparency of information and close collaboration with the relevant bodies until the incident is resolved.
- Subsequent analysis of the reason for the discharge or spill.
- Adoption of the appropriate preventive measures to reduce the chances of a recurrence.
- Implementation of new technologies for environmental monitoring such as the use of underwater drones.

We also work with various universities (such as the University of Alicante or Playa Ancha University, in Chile) in research on the environmental impact of concentrates from desalination facilities on the marine environment and species. This research also sets out the best practices for the environmental monitoring of these impacts. Likewise, we work to broaden the concept of circular economy applied to desalination waste, through research projects aimed at obtaining salts and chemical compounds from desalination plant concentrates for their subsequent repurposing.

[303-4] > Water discharged (ML) Destination of discharged water

Destination	2021	2022	2023
Discharges to surface water	43.90	75.58	757.84
Discharges to groundwater	9.11	6.17	36.61
Discharges to sea water (except brine)	26.78	35.18	45.98
Discharges to third parties	618.24	635.28	518.67
Total	698.03	752.20	1,359.10

2021 2022 2023 The discharge volume was calculated on the basis of standard discharge coefficients by activity, as published by various sources. The entire volume of discharge to sea water belongs to the "other water (total dissolved solids >1,000 mg/l)" category. The remainder of the volume of water discharged belongs to the "fresh water (≤1,000 mg/l)" category. 1 ML is equal to 1,000 m³.

> Discharge of water in water stressed areas (ML) Destination of discharged water

Destination	2021	2022	2023
Discharges to surface water	41.17	74.22	735.71
Discharges to groundwater	8.66	6.17	21.78
Discharges to sea water (except brine)	26.37	34.79	31.49
Discharges to third parties	543.90	483.61	450.13
Total	620.10	598.78	1,239.11

2021 2022 2023 The discharge volume was calculated on the basis of standard discharge coefficients by activity, as published by various sources. The entire volume of discharge to sea water belongs to the "other water (total dissolved solids >1,000 mg/l)" category. The remainder of the volume of water discharged belongs to the "fresh water (≤1,000 mg/l)" category. 1 ML is equal to 1,000 m³.

Below we include, for the first time, a breakdown of the water discharged by level of treatment applied to it:

> Water discharged by treatment (ML)

Treatment Level	2023
Primary treatment	52.34
Secondary treatment	760.25
Tertiary treatment	335.90
Untreated water discharged to a third party	165.89
Untreated discharged to the natural environment	44.72
Total	1,359.10

2023 1 ML is equal to 1,000 m³. Untreated water discharged to a third party and to the natural environment is discharged water of good quality and does not require authorization and therefore additional treatment pursuant to local legislation. Brine discharge from the desalination process of water from our desalination plants totaled 282,240.42 ML in 2023. In water-stressed areas, brine discharges to the sea amounted to 152,508.38 ML in 2023. The total volume discharged in 2023 was 1,359.10 ML, slightly higher than in 2022. This was due to the increase in activities in which more water is returned to the natural environment, specifically to surface and underground water. Of the total water discharged in our activities, 1,148.49 ML were previously treated

in our water treatment plants. Integrated Sustainability Report - 2023 190

6.5 Sustainable cities At Sacyr

we want to help create the cities of the future; cities that are innovative, resilient to the adverse impacts of climate change, and committed to renewable energy and green infrastructure, as well as being inclusive and safe for all their inhabitants. In 2023, we continued to support initiatives linked to sustainable urban development, low-carbon mobility and the efficient use of water and energy in innovative projects to boost quality of life in cities. Sustainable urban development Energy efficiency and saving water Sustainable mobility Innovation for cities

6.5.1 Sustainable urban development

By promoting urban development we aim to be in harmony with nature, caring for biodiversity and respecting green spaces, which are a source of health in cities.

6.5.1.1 Sustainable construction

Our efforts to include more responsible social, environmental and economic criteria in building and urban development has been underpinned for more than 10 years by the execution of construction projects with sustainable construction certificates such as LEED, BREEAM, VERDE, CES (Sustainable Building Certification), GSAS DESIGN & BUILD, CEEQUAL, WELL and SITES. In 2022 we teamed up with AENOR to define the “Sustainable Building. Calculation of a construction company’s rate of contribution to sustainability” certification, which approaches a building’s sustainability from the design phase all the way through to construction. In 2023 this certification was approved and in 2024 we will weigh the option of implementing it in construction contracts for singular buildings.

Certificate	GSAS Design & Build	CEEQUAL	LEED	WELL	VERDE	BREEAM	CES Hospitales	SITES	LEED >
Projects with sustainable certification	40%	40%	9%	2%	2%	2%	2%	2%	191

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Over more than 10 years, in total, we have executed close to 2 million m² in building projects and more than 13 million m² in civil engineering works with sustainable certification. In 2023 we obtained LEED certification for the building works at the Plaza Europa 34 Offices and the Conrentramway Buildings (Edificio Badajoz 97), both in Barcelona (Spain) and the following works were completed: Navy Lodge Expansion in Cadiz and Lot 1 Méndez Álvaro in Madrid, both in Spain. We also obtained BREEAM certification for the Kube Tarragona-Torre project (Spain) and work was completed at Fractal residential development in Madrid and Amazon’s logistics warehouse in Badajoz, both in Spain, and Ulster University in Northern Ireland. Beyond the building sector, we have also completed a CEEQUAL certified road, the A6 - Dungiven To Drumahoe Dualling highway in Northern Ireland (UK). Projects with sustainable certification in execution in 2023 [CRE-8] [SASB_IF-EN-410a.1] [SASB_IF-EN-410a.2]

Other sustainable projects

In addition, we make buildings that are not covered by sustainable certification, but that are also recognized for their energy efficiency, lower water consumption, use of low emissions materials and in which we have minimized waste generation, based on the principles of circularity. We built a wooden building in the 238 homes project in Illa Glories, Barcelona (Spain) This project consists of a complex of four buildings with public housing for rent and for sale. The use of this material has excellent benefits, such as the speed of execution of the work and the incorporation of industrial processes that allow us to reduce the waste generated. Furthermore, it is a renewable resource, that is PEFC Chain of Custody certified, that stores carbon as it grows and generates less CO₂ than other materials (concrete and steel) in its manufacturing. Furthermore, wood has thermal properties that reduce the need for heating and cooling (non-renewable primary energy consumption is 4 times lower than in a nearly zero-energy building). In 2023 we implemented the digitalization of the project through the PlanRadar, platform to optimize control of the units in execution.

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Our commitment to constructing buildings with nearly-zero energy consumption has led us to certify one of our experts as a Passive House Tradesperson and a Passive House Designer. A nearly zero-energy building

is one that has very low energy requirements and achieves high energy efficiency with little or no energy consumption. Current European regulations oblige projects to factor in this concept and for buildings to meet the necessary criteria to achieve it. At Sacyr, we have been implementing BIM models for years, in a number of countries, showing that this methodology is yielding better results than traditional contract management models. We construct buildings with lower energy consumption than nearly zero-energy buildings Aligned with the technical energy demand criteria for activities 7.1 Construction of new buildings and 7.2 Renovation of existing buildings of the Taxonomy (Commission Delegated Regulation (EU) 2021/2139, of 4 June 2021). Furthermore, in Sacyr Chile we have developed the CALO app for the digital control of inspection protocols in works execution units. This platform optimizes communication between those involved in quality control and improves real-time works execution monitoring. The App can also be used both on cellphones and tablets and one of its best virtues is that it adapts to Sacyr's management system and can be used in any project and country. We certified the BIM model By certifying to ISO 19650-1 and ISO 19650-2 standards (Organization and digitalization of information about buildings and civil engineering works including BIM) we aim to strengthen current project development and raise the quality of our works and assets. This achievement paves the way for us to take part in new projects, improve our scores in bidding phases and position ourselves as leaders in the BIM projects we are involved in. The company has been managing BIM projects for years, in a number of countries across different continents, before in 2023 implementing BIM in projects all over the world. This notably include hospitals, tertiary use projects and transportation networks throughout Latin America, English-speaking countries and Europe. We highlight the BIM management of the Jorge Chávez International Airport construction project in Lima, Peru, where we work with different uses and BIM levels such as controlling works execution by means of 3D scanning, 4D construction simulation to plan construction activities or lastly the planning of the maintenance facility management of the future airport. Thanks to CALO, we have improved our documentary control by digitalizing the information, allowing protocols to be signed both by in-house Sacyr personnel and Fiscal Works Inspectors, thereby optimizing approval times.

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We have more than 2,300 beds and around 600,000 m² constructed in sustainably certified hospitals. Sustainable hospitals At Sacyr, we build and operate sustainable hospitals that are more environmentally-friendly and more human, improving the experience of patients and their families. We have built hospitals in Canada and Wales (UK), equipped with cutting-edge technologies to improve the quality of care, comfort, patient and worker health and reduce the environmental impact of the buildings themselves. One such hospital is Velindre Cancer Centre (UK), the design of which is strongly environmentally and ecologically focused and which is fitted with high energy efficiency systems. The infrastructure is respectful of its environment, its landscape value and the surrounding biodiversity, since it is in a protected area. For this purpose, several measures have been implemented to guarantee the preservation of existing species, such as the location and relocation of animals and plants for their conservation, or the development of research and action programs based on the hibernation periods of protected species. Hospital 12 de Octubre (Spain) has all the necessary accessibility measures in place to ensure that everyone can access and conveniently make use of the facilities. There are parking spaces reserved for people with a disability, as well as bathroom facilities with changing rooms, showers and toilets with all the functionalities adapted to itineraries in the building designed for people with special needs. With regard to the construction materials, we highlight the use of low CO₂ emission concrete (that combines high quality materials and additives from industrial waste). It was supplied from plants located at an

average distance of 10 km from the site, in large concrete mixers, reducing the number of trips and the emissions due to transportation. We obtained Sustainable Building Certification (CES) in Chile Our Alto Hospicio Hospital was among the winners in the 2023 edition of the Sustainable Building Certification (CES) awards. This construction stands out for its energy-efficient design, reducing drinking water usage by 41% and saving 80% of water for irrigation purposes, also obtaining a top score for waste management. The complex contributes 235 beds to the public hospital network in Chile. We were recognized in the TOP 20 Hospital Awards in Spain We manage hospitals to high quality and environmental sustainability standards, having received the recognition of the TOP 20 Hospitals Awards for our management of the Infanta Cristina and Hospital del Henares hospital concessions (both in Madrid). We are committed to accessible, green and safe hospitals Integrated Sustainability Report - 2023 194 6.5.1.2 Urban nature in our projects In our projects we always aim to care for nature and promote the inclusion of green areas that are also sustainable. In 2023 we implemented various projects in natural environments within cities:

- Sacyr Water took part in the initiative run by the Lo Barnechea commune to reduce fresh water consumption by 80% in the El Huinganal Park. Lo Barnechea is the commune with the highest residential consumption of drinking water in Chile, especially in the summer. Accordingly, at Sacyr Water we constantly strive to raise awareness in the local community, sharing knowledge, disseminating educational materials and organizing training pills.
- Sacyr inaugurated Plaza de la Sustentabilidad in Santiago de Chile, which aims to be a place surrounded by green areas, children’s playgrounds and a pet service area in the city. This new park, designed with a sustainable development in mind, covers an area of 16,800 m2 of green spaces, in which low waterconsuming trees and shrubs have been planted.
- In Milan (Italy), we are refurbishing the Policlinico Maggiore Hospital, Mangiagalli and Regina Elena Foundation, whose central block will have a roof topped with a walkable garden open to users of the hospital. The green roof will measure over 5,500 m2 and will be watered using recycled gray water from the hospital itself. This green oasis in the middle of the city will improve the experience of hospital users and will contribute positively to reducing pollution from traffic congestion.
- In Madrid (Spain), we are building a therapeutic garden adjacent to the new 12 de Octubre Hospital building, designed to improve the experience for patients, their families and their pets. The garden will cover more than 9,000 m2 and the flower beds more than 500 m2 .
- Las Setas de Sevilla (Spain) is considered to be the world’s largest wooden structure. In 2023, 16 mobile islands were installed, which serve as both benches and planters where Mediterranean vegetation takes center stage. These pieces invigorate the space and afford it more versatility, as they are mobile and can form different landscape patterns, depending on the needs of this bustling square. In addition, 512 m2 of perimeter flowerbeds and the main stairs, inspired by the riverside woodland, have also been installed. This space also has 16 large olive trees and more than 878 plants and shrubs. Further highlighting the value of sustainability, the hallmark of Las Setas de Sevilla, two new children's areas have been created and a total of 641 end-of-life tires were recycled, thereby avoiding the emission of 13.2 kg of CO2 into the atmosphere. In addition, Sacyr staff take part in volunteer projects to improve the quality of city parks. Examples of these actions are:
- Voluntary waste collection day (urban waste such as glass, paper, plastic and food leftovers) in the Periurban Green Space (La Cantera Park) in Madrid, in which the Quality, Environment and Energy Department collected 45 kg of waste in a single morning.
- A day of support for team physical activity and waste collection in the community of Pegões, Portugal, in which the Health and Safety team from the San Isidro office walked 7 km and collected 320 kg in the area surrounding a small lagoon. Las Setas de Sevilla. Spain 195 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.5.1.2 Energy efficiency

6.5.2 Energy efficiency and saving water To reduce energy consumption at our sites, as part of the Decarbonization Plan within the framework of our Climate Change Strategy, we implement more than 300 initiatives in eight countries where we operate. Of the various measures, we highlight the actions included in this Plan and implemented at our headquarters in Madrid (Spain): In 2023, these measures allowed us to reduce around 175,000 kWh or 17% of the building's initial energy consumption. 100% of the electricity consumed at Sacyr's headquarters in Spain has a guarantee of origin certificate. We have another three offices in Madrid and one in Seville (Spain) that consume electricity from renewable sources. The following table shows the energy intensity and greenhouse gas emissions in the construction business's leased and owned buildings in the last three years. Optimization of the temperature and start times of air conditioners. Automation of vending machines. Reduction of lighting hours, as well as automation of lighting in car parks, rooms and signs. Installation of photovoltaic panels. 175,000 kWh of savings from these measures We use solar energy at our headquarters in Madrid We installed 140 solar panels at our headquarters, that generate more than 90,000 kWh of renewable energy per year, covering approximately 10% of the building's electricity consumption. Building on this momentum, we aim to evolve our energy autonomy through renewable alternatives. [CRE-1] [CRE-3] [CRE-4] > Energy and emissions intensity Energy Intensity of buildings (kWh/sqm) 85.42 90.70 84.39 GHG Emissions intensity of buildings (kg CO2 eq/m2) 15.65 9.14 7.65 GHG Emission Intensity of new buildings and redevelopments (t CO2 eq/ € M) 7.06 8.01 7.72 2021 2022 2023 Integrated Sustainability Report - 2023 196 Cities 2030, towards the energy transformation of our cities We are members of the Cities 2030 initiative by Forética, which is a benchmark business platform aimed at fostering public-private partnerships in the development of sustainable cities in Spain. In 2023, this forum has focused on the energy transition in cities, addressing topics such as energy efficiency in infrastructure and buildings, the commitment to renewable energy and the importance of selfconsumption, among others. We are digitalizing the meters in the Autonomous City of Melilla Sacyr Water will replace more than 27,700 meters for digital devices that show actual consumption, unlike the analog versions where consumption is estimated. Digital water meters have a remote operating system enabling them to be read remotely, thereby reducing CO2 emissions by avoiding periodic journeys. This means that the Melilla service will read meters every three months as the information is available 365 days a year, thereby multiplying by 2,160 the available information. In addition, it will offer significant information such as indoor leakage alarms, reverse flow alarms or detection of high night-time consumption. Accordingly, by means of tighter controls on the flow of water in the supply network, it will be possible to boost efficiency in each sector, increase supply guarantee and manage water more sustainably. 6.5.2.2 Saving water The efficient management of water resources is pivotal part of our project execution. In its integrated water cycle contracts, Sacyr Water guarantees quality and sustainable supply and sanitation in cities. While all our sustainable certified buildings take into account efficient water consumption factors, all our projects promote initiatives geared to saving water. In addition, through the management of desalination plants, we ensure maximum water supply quality in urban areas with limited availability of water resources. Examples of these projects are the Tenerife desalination plant and the Alicante desalination plant, both in Spain. In section 6.4.2 Sustainable water management, we detail all the measures we carry out in different projects to promote efficient water use. The table below shows water intensity in the construction business's leased and owned buildings in the last three years. [CRE-2] > Water intensity in buildings Water intensity (m3/m2) 0.21 0.23 0.43 2021 2022 2023 197 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 6.5.3 Sustainable mobility At Sacyr we visualize the cities we

would like to live in. Accordingly, we are committed to multimodal, efficient and low-emissions mobility by installing charging points, gradually electrifying and hybridizing our fleet and raising awareness around us. We carry out various measures to minimize the impact that go beyond the obligations linked to sustainable mobility plans in the countries where we operate. Through these measures we promote sustainable mobility across all business areas, achieving: Job flexibility to reduce journeys in the rush hour. Promotion of citizen initiatives to foster sustainable urban mobility. Organization of events with sustainable development in mind. Videoconferencing to minimize travel. Plan for the gradual replacement of the vehicle fleet with less polluting vehicles. We encourage our employees to use public transportation and carpooling to cut emissions and save time and money. Increased numbers of electric charging points in car parks at corporate centers. Tax benefits for the use of public transport, via Sacyr Flex. Specific areas to park bicycles and scooters. Promotion of technological innovation projects to foster sustainable mobility. 269 497 271 Charging points installed. Low-emission vehicles (ECO + ZERO) in our fleet. Employees using Sacyr Flex for transport. 12 de Octubre Hospital. Spain Integrated Sustainability Report - 2023 198 We joined in on World Bicycle Day in Mexico At Tláhuac Hospital all the collaborators in the contract held a cycle race to promote the benefits of cycling both for people's health and the environment. A company has also been hired for the collective transportation of workers by bus, to offer more comfortable and safer journeys with a lower environmental impact than transportation in private vehicles. More than 33% of the contract staff make use of this service. We reduced private vehicle use at Sohar Desalination Facility At Sohar Desalination Facility we raised employee awareness to get them to reduce their use of private vehicles for their commute, and to instead travel on a minibus made available to people traveling long distances to work. In total, more than 250 km have been covered by minibus, compared with the 1,640 km covered on average by employees to get to the office. We promote carpooling at our headquarters From July to September, at our Condesa de Venadito headquarters we launched a pilot project with the Ciclogreen app to encourage employees to carpool on their journeys to the office. This initiative was aimed at enabling people commuting on similar routes to cut emissions and save time and money by traveling together. The results were as follows: 4,668 km traveled €891 saved 1 396 kg CO2 avoided² Given the high participation rate in the pilot project, we added new functionalities to improve the user experience regarding the link between driver and passenger. We continue to support this initiative, making available awards for people who carpool and rewarding them for continuing to promote sustainable mobility. ¹ To calculate the cost savings we estimate an average of €0.10 per kilometer. ² To calculate CO2 emissions avoided we use the emissions factors in the UK government's DEFRA database. Promoting micro mobility and public transport in Belfast (UK) In the Belfast Transport Hub project we handed out travel cards to employees who need to use public transportation to get to work. The staff working on this contract also took part in Bike Week again this year, promoting cycling to work. Below, we highlight some of the actions implemented over the course of 2023: Alto Hospicio. Chile 199 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Sustainable events Staging events that comply with environmental sustainability criteria throughout the value chain, from the supplier contracting to the event's energy management, is another requirement in our commitment to environmentally, socially and economically responsible development. In 2023 our Annual General Meeting was certified by Eventsost as a "Sustainable Event", as it met the sustainability criteria established by this body and passed the preliminary assessment and in-person audit. We offset the emissions generated by this event, which are estimated to be 1.66 tons of CO2 eq, along with the emissions triggered by the trips made by executives this year. The emissions generated by the

symposium correspond to journeys by transportation (0.61 t CO₂ eq), the catering arranged (0.14 t CO₂ eq) and emissions linked to other services to prepare the event (0.91 t CO₂ eq). The project chosen for offsetting the 1.66 t CO₂ eq is located in Villanueva de Abajo (Palencia, Spain). In this location, we will replant a public utility forestry area affected by a fire, by planting Austrian pine trees (*Pinus nigra*). This initiative will help reduce erosion, conserve biodiversity and create green jobs in the community. Tlahuac Hospital. Mexico Integrated Sustainability Report - 2023 200 7 Team Ambition 201 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.1 Professional development 202 7.2 Diversity, equity and inclusion 214 7.3 Safety, health and well-being 219 Integrated Sustainability Report - 2023 202 Driving a global and transversal organization Optimizing processes and policies [3-3] We hope to be a benchmark in infrastructure development and P3 management, thanks not only to our innovation-driven value proposition and commitment to the environment, but also to our focus on the professional and personal development of a diverse workforce. At Sacyr, fostering talent is one of the main levers of our Strategic Plan. We want to be a benchmark employer and attract top-performing professionals. We want to nurture in-house talent through the integrated personal and professional development of our people. Accordingly, we adapt to the current state and the future of work, adding diversity as a value and competitive advantage. To achieve this, the strategic plan devised by our People Department has the following goals. At our core are the thousands of people whose talent contributes to the achievement of our goals; people to whom we offer safe and attractive jobs, great opportunities for development and training, by means of a Management Policy that places our people firmly at the center of our strategy. STRATEGIC PEOPLE MANAGEMENT PLAN Enhancing the employee experience • Standardization and homogenization of policies and processes with a global and transparent approach. • Implementation of solutions that boost our management efficiency, cutting costs and mitigating risks. • Standardization and internationalization of the selection model to be able to attract top talent. • Increase in the scope of our development model with a high degree of satisfaction among those taking part. • Development of specific programs for our key roles, with the focus on their commitment. • Launch of initiatives aimed at fostering care for our professionals. Our Management Plan places people at the core of our strategy. Achieving Strategic Goals - Our Accomplishments in 2023 7.1 Professional development 7 Team ambition 203 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.1.1 Description of the workforce 7.1.2 Talent acquisition, management and development 7.1.2.1 Acquisition Strategy [2-7] [405-1] In 2023, Sacyr's average headcount was 16,106 people (41,070 in 2022), which represents a 60.8% decrease on the previous year. Of this total, 12,093 are men (23,334 in 2022) and 4,013 are women (17,737 in 2022). The breakdown of our workforce by contractual modality reveals 12,534 open-ended contracts (29,802 in 2022) and 3,572 temporary contracts (11,268 in 2022). The downsizing between 2022 and 2023 is due to the scaling following the divestment of the Services business unit this year, and is consistent with the company's new reality and activity. The gender breakdown is consistent with the activities carried out in the sectors in which the company operates, where men tend to be in the majority. As for the distribution of the workforce by employment contract type, the low level of temporality underpins the Group's commitment to stable recruitment in line with ESG goals, despite operating in industries in which projects tend to be of a fixed duration. [3-3] We invest in attracting top talent, developing these top professionals and training them continuously to ensure the short-, medium- and long-term success of our business endeavor in a changing and volatile environment. Our Talent Acquisition policy is aimed at attracting and

incorporating professionals who identify with our purpose. To screen this talent we have a rigorous and global selection procedure in the framework of our transversal management system by values/competencies, which in acquisition translates into the application of our own “SmartRec” methodology, aimed at guaranteeing objectivity, equal access to opportunities and diversity as key components of sustainable selection processes. This methodology establishes a standardized, common and transversal framework of reference across all the businesses and countries in which we operate and comprehensively covers all phases of the talent acquisition process, from curricular screening to the selection interview.

Integrated Sustainability Report - 2023 204 2023 talent acquisition initiatives • Agreements with universities and business schools • Participation in employment forums • Recruitment programs – Sacyr Construye Futuro • Referral programs • Employer Brand Positioning • Value Proposition Enhancement

Employer brand In 2023 we built a unique and global brand to represent our Employee Value Proposition (EVP) at every level, that is present in all our processes and throughout our people’s life cycle: from the talent acquisition strategy, throughout their career, until they leave the company. A brand designed to effectively convey our hallmark attributes as an employer, to help attract and keep the talent we need.

“SacyrOnCourse” Onboarding process – Welcome on board New recruits (with a corporate e-mail address) take part in an onboarding program that has recently been standardized and approved at the group level, to support them in their first few weeks and help them to swiftly and successfully integrate with the corporate values and culture, as well as the normal workings of their job. To evidence the commitment to our people, it is worth highlighting that our new recruits rate us very highly when asked if they would recommend our company as a good place to work (NPS of 40).

205 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.1.2.2 Talent management and development [3-3] We are an international, diversified and multicultural group with a clear preference for In-House Talent to address the challenges the future will bring us. We nurture the development of each person, aiming to make them better professionals, more competitive and prepared. To do this, we have several talent management and development tools: Our development model Developing our teams is paramount for Sacyr. We see it as a continuous, global and universal process in which each person is the captain of their own personal and professional development. In this context, there are three development principles: Using this framework, at Sacyr we have defined our Program Ecosystem, comprising: Discover From our professional goals to our strengths and areas of development. Structural programs Designed to reach everyone at the company in accordance with the group they belong to (new graduates, skilled posts, managers and senior management). Contextual programs Designed to support and accompany our people on professional milestones when they undertake substantial changes in their area of responsibility. We call these Transition Programs. Act Defining specific and measurable actions to achieve our goals. Impact Fostering both professional growth and the achievement of Sacyr’s objectives.

Integrated Sustainability Report - 2023 206 In 2023 we launched the first two editions of our Programa Conecta a voluntary program aimed at all the Group’s mid-level permanent staff. This program aims to hone and improve skills linked to the professional development of these profiles. More than 150 professionals from more than 10 countries took part in the 1st edition. 53% of the participants were women, their average age was 43 and their average seniority at the company was 11.8 years. The program was exceedingly well received and highly rated. We also launched a number of Transition Programs aimed at people reaching a significant professional milestone such as a promotion to management or executive positions, international relocations to key posts (expatriations and repatriations) or experiencing a substantial change in their roles. The main purpose is to fast-track their

adaptation to their new role, smoothing the learning curve to optimal performance and providing them with the necessary tools and support. An edition of this program was held for 29 new Group managers from Spain, Chile, Colombia, United Kingdom and Peru. From a methodological perspective, our programs combine methodologies and actions to ensure that the defined objectives are achieved, using the Individual Development Plan as a common thread throughout. We include self-knowledge tools, training pills and various forms of support such as mentoring and coaching, at both the individual and group level.

Performance management [404-3] This annual process is aimed at obtaining updated, valid and reliable information on our teams. This allows us to proactively manage our internal talent, stay ahead of the game and reduce the Group's risks associated with future needs. We have steadily introduced improvements in the process and we have broadened its scope among our professionals, making it more expedient and useful. It has now been digitalized through our FOCUS tool. In 2023, 3,983 people underwent performance reviews (4,311 in 2022).

> Participation in the performance reviews by gender and group: Gender % Participation Men 67.36% Women 32.64% Professional category % Participation Executives 1.53% Managers 19.59% Skilled staff 77.35% Support 1.53%

For Sacyr it is vital to have the right person in the right place at the right time. To achieve this, the key dimensions we take into account are their performance and their potential, both of which constitute a meaningful tool that helps us identify and properly manage the talent we have. Note that in parallel to this process we nurture a culture of continuous feedback to increase job satisfaction, productivity and engagement.

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Target-based management Our management model establishes, monitors and assesses goals, linking the payment of variable remuneration to the achievement of those goals. Furthermore, for some long-term incentive schemes, goals are linked to the company's share value, thereby aligning our management team's goals with those of our shareholders, thus making the company's value one of the remuneration goals.

Internal mobility We facilitate mobility between companies and businesses, taking into account both the organization's needs and the skills and interests of each individual. All Group vacancies are posted in house and are visible to all on the Intranet, allowing each candidate to apply if they consider they match the profile and the vacancy is good for their professional development.

International mobility We are an international group with a presence in more than 20 countries with highly diversified activities, allowing us to offer our teams the chance to develop their talent and their experience. We provide the opportunity, they set the limits. At the end of December there were more than 278 expat professionals. International mobility involves addressing a number of critical measures before, during and after expatriation. Moving means upheaval, which is why we take a global and centralized approach. With the aim of promoting and aligning professionals' actions with the company's strategy, at Sacyr we have a global Target-based management model, based on market best practices. This enables us to encourage people to become engaged in the achievement of the company's goals and directly involved in the results, increasing their commitment and loyalty in the long term. All our employees are given Group goals that foster one of the premises of Sacyr's business model, namely to work in a single direction under the slogan "One Sacyr". It is worth emphasizing that at Sacyr we work to achieve results, but not just anyhow. That is why we distinguish our goals (the 'what') and the way we want to achieve them (the 'how'). The latter is what we believe sets us apart and is a reflection of the guidelines in the Strategic Plan. We are referring to: Talent-linked objectives, focusing on caring for our employees as the company's most valuable asset, making decisions based on merit, ensuring team sustainability by linking variable remuneration to the succession plans of all the company's managers and fostering diversity in our teams as a value proposition.

The third axis is innovation. We consider innovation to be a part of our DNA and we encourage all our employees to pursue continuous improvement by quantitatively incorporating an innovation target. Another aspect of the 'how' is that our projects must also ensure sustainability and highlight the importance of ethical working and obliged compliance with the Code of Conduct worldwide.

1 3 2 Integrated Sustainability Report - 2023 208 7.1.2.3 Training [3-3] In the current environment in which change is the only constant, the only way to ensure that our professionals are equipped with the knowledge and skills they need to perform is through continuous training. Accordingly, the main objective of our training model is to nurture a culture of continuous learning in which each individual takes charge of their own development. We provide them with all the means and resources through our online training platform (Explora) for them to design their own training plan according to their interests and needs, and to decide quite freely what they want to do, when and how.

> Training model principles Sustainability Freedom Expediency Personalization Engagement Our platform offers a range of training programs: Through our training, we guarantee the permanent development of the people who make up Sacyr globally; aligning training with the needs generated in the business strategies. Mandatory courses, such as those covering legal and compliance aspects. Voluntary courses received by each user, either because of their role or at their own request. Self-training: this content allows the training plan to be customized according to the interests of each professional. We have titles on a range of topics and in various formats. Charted routes Suggested routes Optional expeditions

209 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Our training in figures [404-1] [404-2] A total of 297,386.82 training hours were delivered in 2023, compared to 539,434 hours in 2022. In addition to the training coordinated by the People area, we provide training led by the Regulatory Compliance, Environment and Health and Safety departments, as outlined in the relevant sections.

> Training hours by gender and professional category

Professional category	Gender	Men	Women	Total	Hours	Percentage
Senior executives	Men	1,744.75	0.87%	750.66	0.78%	2,495.41
	Women					0.84%
Management	Men	19,455.42	9.66%	8,447.49	8.81%	27,902.92
	Women					9.38%
Skilled staff	Men	77,528.17	38.48%	54,546.37	56.91%	132,092.54
	Women					44.42%
Support	Men	102,772.16	51.00%	32,123.79	33.50%	134,895.95
	Women					45.36%
Total		201,500.50	100%	95,886.31	100%	297,386.82

> Average training hours by gender

Gender	Average hours
Men	17.86
Women	22.57
Total	19.15

> Stand-out training initiatives in 2023

Training area Notable actions Languages Adaptation of the training model to the 100%-digital environment, offering more freedom for self-management. Information security Awareness actions for the entire workforce on information security, the proper use of personal data, passwords, etc. Sustainability Awareness on sustainability, ESG concepts, etc. Health and Safety Awareness and educational measures to improve mental health, reduce stress and burnout, enhance sleep hygiene, etc. Digital transformation Expansion of the catalog of courses available to better adapt the workforce to the digital world. IT tools Live sessions with experts on specific actions to boost knowledge and efficiency in the use of the platforms. Diversity Diversity awareness for the entire workforce. Skills development Expansion of the catalog of available training, giving employees access to more courses to improve their skills. Leadership Expansion of the catalog of available training, giving employees access to more team management and leadership courses.

Integrated Sustainability Report - 2023 210 7.1.3 Listening to Employees / Employee Experience One of the Strategic Plan goals for the People department is to improve the experience of each employee. Accordingly, we have endeavored to listen to them and gauge their experience. It is paramount for us to understand how employees experience the most important junctures of their relationship with the company, in order to know them, understand them and obtain useful information for the departments

that allow us to take measures for transformation and improvement. Our model for analyzing commitment and satisfaction has changed. We previously conducted climate surveys that gave us a response to a specific circumstance but did not allow us to delve more deeply into what employees find motivating or engaging, and were highly conditional upon the timing of the questions. Now, we continually keep our finger on the pulse to stay abreast of each collaborator's experience. This gives us a more global vision when trying to understand specific junctures in the relationship, showing us the collaborator's global experience, from when they join to when they leave. It also helps us to better understand what motivates and engages them, and gives us information on the specific levers for improvement. To stay in tune we have a tool we customized for this purpose, called Sacyr Te Escucha, through which not only can we conduct surveys but we can also harvest the findings to design lines of action.

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7.1.4 Remuneration and benefits [201-3] [401-2]

Remuneration Our main mission when it comes to remuneration is to design, implement and review our remuneration policies to achieve fairness, competitiveness and motivation for our workforce. Our plan is aligned with our overall remuneration strategy and talent value proposition, which also helps attract, retain and engage employees by helping them to achieve personal and professional balance throughout their life cycle. The company's remuneration structure comprises fixed remuneration, variable remuneration, social benefits, a pension plan, a long-term incentive plan and an international allowances policy. Employee benefits Sacyr offers a wide range of benefits that are segmented by groups, depending on the policies established in each country and according to the various market practices. On the one hand, we offer benefits focused on physical and mental well-being, such as:

- Health insurance.
- Life insurance in case of death in service or disability.
- Office sports club (tournaments, yoga, pilates, boxing, mindfulness, swimming classes).
- Wellness applications (healthy cooking recipes, online fitness or mindfulness classes, talks on various well-being topics).
- Physiotherapist in some offices.
- Canteens with healthy food.
- Workshops to prevent psycho-social risks.
- Psychology service to treat certain conditions.

In addition, there are adequate benefits to ensure financial well-being:

- Flexible remuneration in Spain for eligible employees in accordance with the legislation. The flexible remuneration program allows employees to replace part of their monetary remuneration with remuneration in kind offering certain tax benefits. The products offered under this program are: health insurance, meal vouchers, transit cards, childcare vouchers, job-related training, retirement savings insurance, car leasing and shares in Sacyr.
- Company discounts.
- Social benefit plan through various retirement savings schemes. Employee Ownership Plan

Since the first Sacyr Employee Ownership Plan was launched in 2019, the number of people who have voluntarily taken part in the various schemes over the years has grown sharply, from 62 people in 2019, with an investment of €389,050, to 81 people and an investment of €438,543 in 2023. This plan grants them a dual benefit: on the one hand, they obtain tax savings and, on the other hand, as shareholders they are fully entitled to receive dividends. This shows how confident our teams are regarding the company's growth and creates a greater sense of ownership of the company's strategy.

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212 Benefits usually vary according to the person's life cycle, their personal situation or professional status, and they help to manage remuneration, increasing their loyalty. On the other hand, we have implemented a series of actions, policies and procedures to enable our people to balance their family and personal lives while developing their professional careers:

- Sacyr Concilia is an internal program to promote effective measures, most notably:
 - Día Sin Cole (DSC!): activities are organized for children of staff on non-school working days. This year more than 193 children took part. -

Designing the work calendar to match the school calendar: taking into account non-school days when drawing up the company's work calendar. - Facilitating child care options. Breastfeeding rooms in Peru, Uruguay and Paraguay, and day nurseries in Mexico and Chile. • Framework Policy Governing Working Hours: establishes the general principles and guidelines regarding working hours that govern labor relations at Sacyr globally, and includes a commitment to ensuring that employees do not exceed the maximum working hours and are given at least the minimum breaks established in the regulations of each country. • Flex-Working Policy, for the flexible organization of work hours and the possibility of working from home, in accordance with the Flex Office Program requirements. • Guide to Work-Life Balance Measures, which sets out the kinds of leave employees may request and how, and which was updated this year. • Right to disconnect law: launch of specific training and awareness globally, with more than 1,600 people trained. These policies have earned us a number of recognitions, such as Certification as a FamilyResponsible Company (FRC) in Spain, Colombia, Peru and Chile. We highlighted this commitment internally through two commemorative days: • Work-Life Balance and Co-responsibility Day in Spain, March 23. This year we have shared and showcased our progress by renewing our FRC certification in Spain. We actually improved our score to “ company proactive towards work-life balance”. Día Sin Cole (DSC!) Certification as a FamilyResponsible Company (FRC) 213 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.1.5 Labor relations [2-30] [3-3] [407-1] Labor relations at Sacyr are carried out in accordance with the labor regulations and collective bargaining agreements in force in each country. Sacyr fully guarantees the rights to freedom of association, trade union representation and collective bargaining of all our employees, and we are in constant dialog and negotiation with the legal representative bodies of employees and unions, complying with the ethical and transparent principles that guide best practices in negotiations at the company. We promote labor relations open to constant dialog with our workers and their representatives, taking them into account in the company's various processes. In 2014 Sacyr signed a Framework Agreement with the International Federation of Building and Wood Workers, Spanish trade union Comisiones Obreras (CC.OO.), and the Federation of Metal, Construction and Affiliated Workers of Spain's Unión General de Trabajadores (UGT- FICA), undertaking to respect and promote the principles defined in the Universal Declaration of Human Rights, the Tripartite Declaration of the International Labour Organization (ILO), the OECD Guidelines for Multinational 1 Only countries with collective bargaining agreements that are registered in the internal system are counted. Enterprises, and the ten principles of the UN Global Compact. In February 2023, Sacyr Construction obtained SA8000 certification in recognition of our commitment to social responsibility and respect for human and labor rights in relation to workers, subcontractors, suppliers and society at large. In Spain, the 142 (317 in 2022) Collective Bargaining Agreements, in various sectors and provinces, provide the working conditions for 100% (99.93% in 2022) of our workforce in 2023. In other more representative countries in terms of workforce, such as Portugal, Chile, Brazil, Mexico and Uruguay (39.64% of the global workforce), we have 23 collective bargaining agreements in place¹. Of these 5 countries, 49.9% are covered (46% in 2022). In the event of company restructuring, we draw up the relevant plans in which we take into account the employees' representation and the resources allocated. Integrated Sustainability Report - 2023 214 7.2 Diversity, Equity and Inclusion This commitment is enshrined in our Diversity, Equality and Inclusion Policy and implemented through the Diversity, Equity and Inclusion Plan. The main objective is to promote the creation of multidisciplinary, transversal and inclusive teams, ensuring equal opportunities and professional development for everyone working at Sacyr, and taking into account what each person needs. We foster inclusive work Gender

diversity: promoting equal opportunities and fostering equity in respect of gender, sexual orientation and gender identity throughout the company. Social and cultural diversity: respecting and harnessing social and cultural differences as a source of added value. Experience and cognitive diversity: nurturing an open corporate culture, as well as professional development and continuous training, as the drivers of invisible diversities (educational and professional experiences, leadership styles, critical thinking, personalities, traditions). People with disabilities: appreciating the unique potential of people with disabilities and harnessing their talents. Generational diversity: helping different generations to work and live together. environments in which our professionals are respected and can achieve their goals, developing professionally and personally, weaving in diversity and inclusion as a common thread throughout the company, including our value chain: customers, suppliers, shareholders, investors, and so on. [2-23] [3-3] Diversity is one of the company's strategic pillars for sustainable development and compliance with the 2030 Agenda. At Sacyr, we are committed to ensuring that our teams are made up of people with diverse profiles, free of preconditions or labels. This is grounded on the following main premises: Outstanding partnerships Escape Room "Código Diverso" (Codename Diverse) in conjunction with the Red Cross 215 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Consequently, we are the first company in Spain accrediting ISO 30415:2021 certification from AENOR for our Diversity and Inclusion Management. Additionally, in 2023 we were rated a TOP 50 DIVERSITY COMPANY in Spain in the Intrama Variable D'24 Report. 42 Average age 131 People with disabilities +7,900 Diversity training hours 56 Nationalities 73% 27% Presence by gender Men Women Our Protocol for Prevention and Action in Cases of Harassment and Discriminatory Acts evidences our commitment in this connection. We have an Ethics Channel as a corporate tool aimed at enabling people to securely and confidentially submit any query or complaint, and a specific committee for prevention and action in cases of harassment and discrimination. Furthermore, we have carried out various training actions at workplaces to prevent and identify harassment. To monitor and measure the main diversity magnitudes, we have a Global Diversity Map, to which, this year, we added intersectionality in the various indicators to enhance our knowledge of our teams and the combination of variables that may impact on personal and professional experiences. We see it as vital to involve our leaders and engage our teams in all initiatives that foster an inclusive culture. For this purpose we have a Diversity and Work-Life Balance Channel for our people to convey their suggestions, concerns, complaints, claims and proposals on this matter. We involve our staff in our annual awareness and consciousness campaigns. This year, to mark European Diversity Month, we launched the "¿Te unes a la ruta de la Diversidad?" (Are you on board for Diversity?) initiative, rolled out in all the countries where we operate, to disseminate and communicate our goals in this realm using various media (videos, posters, etc.). Additionally, in Chile we held a webinar titled "Together for Inclusion". We also periodically conduct training in this area, including this year's global training on Diversity, Equity and Inclusion, using our digital tool and delivered in person at workplaces. We have a Global Diversity, Equity and Inclusion Committee involving representatives from the business units and countries, aimed at monitoring our goals and proposing and designing initiatives to help us achieve them. We also have the "DiversityLabs" involving groups of allied workers, as a forum for sharing developments and analyzing needs and new proposals. Integrated Sustainability Report - 2023 216 7.2.1 Gender diversity At Sacyr we promote the incorporation of the most underrepresented gender in those positions where this situation might arise. Thus, our Strategic Plan encompasses various objectives: • Increase the presence of women in leadership positions to 25% by 2025 (24% in 2023), promoting female talent through external and internal development programs such as "Mujeres

Poderosas, Mujeres Sacyr” (Powerful Women, Sacyr Women) which held its 11th edition and involved 52 women this year. • Ensure transparent and rigorous monitoring of the gender wage gap. • Encourage women to choose STEM careers through different initiatives, such as the collaboration of 15 female engineers as volunteers in ASTI Foundation’s STEM Talent Girl Program. International LGTBIQ+ Pride Day, June 28: • FELGTBI+ training for teams and communication aimed at raising awareness and normalization on this topic. International Women in Engineering Day, June 23: • Videos of in-house role models Why did you choose to study engineering? • Launch of a new program called “Women Community” aimed at creating a community to nurture talent and leadership of women professionals at Sacyr through a range of initiatives like development programs, activities tailored for women in STEM, talks, networking, etc. This year 205 women took part. International Women’s Day, March 8: • Launch of Why celebrate March 8? training. • Involvement in the #EmbraceEquity initiative alongside International Women’s Day. • Streaming of a video showcasing the talent of women role models at the company. In Spain we have Equality Plans consistent with the reality of each business, which are an internal benchmark for setting goals and implementing measures that help us advance in this area in the other countries where we are present, such as Colombia, where this year we improved our score to Silver. Our teams are the main agents of change. That is why we asked for their collaboration in various awareness campaigns to mark special occasions this year: 217 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.2.2 People with disabilities [405-1] Day-in, day-out, we strive to promote the inclusion of this group in our teams by means of in-house, transversal and global programs: • Sacyr Suma: establishes the lines of action to advance in hiring people with disabilities. • Muchas formas de ser únic@s: strengthens our commitment to include people with disabilities, making it easier to obtain the disability certificate for all those people who have not previously completed the procedures. • Monitor@s de seguridad: inclusion of victims of workplace accidents resulting in a disability, to help improve safety conditions in our workplaces and raise awareness among the rest of the workforce. • Sacyr de la Mano: program for employees with children who have a disability or serious illness, who are offered a series of benefits (information and advice, work-life balance, etc.). • Talent Gourmet+: a partnership between Sacyr and Envera Foundation to provide job opportunities for people with disabilities in the Cafestore catering subsidiary unit. • Pausa Activa: consists of sessions for activation, recreational play and return to calm through physical exercise led by people with disabilities from Miradas Compartidas in Chile. In Spain, 1.8% of our workforce has disabilities, and worldwide that figure is 0.9%. To highlight our commitment to this community, we celebrated the International Day of Persons with Disabilities, on December 3, with “Disability Trivia”, an initiative to raise awareness among our employees regarding this reality through dynamics and games involving 136 people from various countries. 7.2.3 Social and cultural diversity We nurture multiculturalism as a source of knowledge and talent in our teams. As part of our commitment to internal mobility, we have a program that fosters synergies between different cultures and experiences, in addition to facilitating the adaptation and onboarding of people who are going to work in a country other than their country of origin, including Guides for Foreigners, an internal Expats Channel, an interactive map featuring country files and the most important cultural information. To showcase multicultural wealth, on May 21, which is International Cultural Diversity Day, we streamed a video with expressions typical of some of the countries where we are present, with the tagline #SacyrNosUne. We currently employ almost 1,200 away from their countries of origin. Furthermore, in the framework of the "Companies for a society free of gender violence" agreement in conjunction with the Spanish Ministry of Equality, this year we were one of the companies chosen to contribute to the

handbook for integrating women victims of gender violence into the labor market. We have worked with the Red Cross on a number of initiatives to improve job opportunities for people at risk of social exclusion through programs like Talento sin límites (Unfettered Talent), En clave de cambio (In the Spirit of Change) or our involvement in the 7th edition of the Job Fair. This year we were recognized by the Integra Foundation for hiring people from this community. Integrated Sustainability Report - 2023 218 7.2.4 Generational diversity [404-2] Our goal is to help different generations work and live together, ensuring that their talents and their different paths are properly managed and harnessed. We have several programs in place to foster synergies between generations: • #SeniorTalent: where in-house role models aged over 50 are chosen to participate in a series of interviews about their career paths, experience and their “legacy” for upcoming talent. • Café con el CEO and Genera Café: periodic meetings with senior executives and talent from all generations to inquire about each person's interests from a generational standpoint. • Young engineers: 5-year development program aimed at supporting them as their careers gain traction, with a particular focus on their international career. Additionally, to mark International Day for the Elimination of Violence Against Women, on November 25, along with Integra Foundation, we thanked more than 70 people who took part in the School of Empowerment, imparting employability workshops to more than 360 people at risk of social exclusion, with a focus on women victims of gender violence. • Next Generation: focusing on ensuring generational handover of managers through specific career plan centered on mentoring, as well as recruitment, training and remuneration initiatives. To celebrate Senior Talent Day, on April 30, we launched “¿Se comunican igual las 4 generaciones de Sacyr?” (Do all 4 generations at Sacyr communicate the same way?), to show the linguistic differences between generations through conversations between more junior and more senior people. 219 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.3 Safety, health and well-being [3-3] [403-1] At Sacyr we are committed to the safety and wellbeing of our employees. Indeed this is a pillar of our strategic plan and to achieve it we have an Health and Safety in the Workplace Policy, reviewed in 2023, and aimed at improving working conditions and the levels of protection, safety and health of our employees, contractors and collaborators, as well as our end users. Sacyr’s Management believes knowledge of its Health and Safety Policy at all levels is essential and must underpin the performance of all company activities. All our employees know the Policy, to which they have access via our intranet and notice boards and in their contracts, and it is also available to all our stakeholders on our website and attached to our industrial and supplier contracts. We consider it a priority objective that all Group activities incorporate, from their planning and throughout their execution, all the necessary measures to avoid risks emerging at the outset and during the deployment of such activities and, in those risks considered inevitable, that all the required health and protection measures are implemented to prevent damage and protect the health of our workers and collaborators. For this purpose, as well as achieving an accident-free environment (0 Accidents Plan) at Sacyr there are other established and quantifiable objectives for all the Group companies, with internal health and safety status KPIs of our contracts. In fact, we go one step further and integrate safety, health and well-being into our business strategy. We are not content with having safe and protected workers; we include the promotion of health in the workplace to ensure our workers are happy at a healthy company with which they can identify. Accordingly, in 2023 an area of psycho-social risks has been established in the Health and Safety Department to promote the psychological and emotional health of our employees, contractors and collaborators. We are thus striving to build a distinct culture of prevention, enabling us to achieve the highest safety standards by engaging the entire organization, our suppliers and contractors and our

partner companies in all of our activities and in every country where we operate. Through the Sustainability and Corporate Governance Committee, delegated to the Board of Directors, and the Sustainability Committee, which are the most senior bodies responsible for sustainability matters, we review, analyze and approve matters relating to the health and safety of our employees and collaborators to ensure they are locked in and applied to our business operations, and that the health and safety objectives associated with each pillar of this dimension are fulfilled. In compliance with the legal requirements on Health and Safety in the Workplace, Sacyr's prevention is structured through its own resources and others arranged with an external prevention service. • Health and Safety Department. • Prevention officers assigned to the centers. • Support structure. • External Prevention Service. We focus on reducing accidents throughout our value chain. We aspire to build a differential preventive culture that enables us to achieve the highest safety standards in all our activities. Integrated Sustainability Report - 2023 220 7.3.1 Occupational Health and Safety Management System [403-1] In addition to complying with all legal requirements, at Sacyr we are implementing occupational health and safety management systems certified to ISO 45001, the leading international benchmark for occupational health and safety, valid through 2025. As well as ISO 45001, Sacyr has also implemented and certified ISO 39001 for Road Safety Management Systems valid through 2024 at 10 of our companies in Spain, having met its goal in 2023 to continue expanding certification to all P3 companies in Spain linked to road traffic, and 1 company in Mexico (+37% of the total). Hence, in 2022 Sacyr revised the Road Safety Policy, and the entire Management System. The internal requirements arising from this System exceed those legally stipulated in the countries in which the company is present, and from the activities performed. A Health and Safety Department with more than 219 professionals has therefore been put into place for the management and continuous improvement of the System through the processes of monitoring and control, internal audit, management review or change management. Accordingly, in 2023 we reviewed the System again, adapting it to the Group's new requirements in each country, making it an international procedure protocol. As a result of this work, we have successfully passed ISO 45001 legal and compliance audits on the occupational health and safety management system implemented at Sacyr group companies' work centers. Furthermore, both the Occupational Health and Safety Management System Manual and the General Procedures are accessible to all employees via the Sacyr Portal on the Health and Safety channel. Employees can also use this channel to consult technical guides, prevention documentation and technical notes aimed at occupational risk prevention. The aim of the Occupational Health and Safety Management System is to ensure that all our activities are carried out on the basis of a strict initial analysis of the work and its associated risks, and that preventive measures are implemented to eliminate or reduce those risks. Americo Vespucio toll road. Chile 221 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.3.2 Identification of hazards, risk assessment and incident investigation [403-2] This Occupational Health and Safety Management System aims to contribute to correctly identify, review, manage and improve the control of the occupational risks to which Group company employees are exposed. This ensures that all our activities are performed in line with a strict initial analysis of the work and its associated risks, together with the implementation of preventive measures to eliminate or mitigate them. At Sacyr, the right to halt work in the event of encountering hazards or dangerous situations is provided in the company's Health and Safety Policy. Any of the mechanisms described in the Health and Safety Management System participation and consultation procedure may be used to file an anonymous or named report of this circumstance, as well as being able to use the complaint lines of the Ethics Channel. All our management systems have a procedure for hazard

identification and risk and opportunities assessment that is adapted to the legal requirements of the place of implementation, assessing daily and non-daily work, planning the preventive measures derived from this assessment and assigning those responsible for their implementation. Similarly, Sacyr has a procedure in place in all countries to investigate all manner of incidents that may arise in any of our contracts in accordance with each country's legislation, and we have also opted to catalog accidents under the U.S. OSHA standard, which enables both the internal standardization of information and comparison with top-tier competitors. In accident investigations, information is first gathered on the basic aspects of the accident, analyzing whether the risks and preventive measures were included in the risk assessment of the task being performed at the time of the accident, and reassessing the risk if necessary. After preventive measures are adopted, the effectiveness of those measures is monitored in case it is necessary to take any action to avoid their recurrence. Jorge Chávez International Airport. Peru Integrated Sustainability Report - 2023 222 At Sacyr we extend our health and safety commitment to our users by improving our infrastructure. We therefore launched two innovation projects in 2023 that will consist of installing devices at critical points on the road that detect vehicles and warn them by means of light signals of hazards ahead, such as pedestrian, vehicle or animal encroachment, and we will also use smart monitoring for early detection of dangerous situations and early road status forecasting. 7.3.3 Occupational health services 7.3.4 Employee engagement and consultation and communication regarding occupational health and [403-3] safety At Sacyr we ensure that we protect our employees' health by hiring competent professionals with widelyacknowledged qualifications and accreditations that comply with the legal requirements and relevant standards/guidelines. While scrupulously respecting the privacy and custody of their medical data, the latter are used to improve workers' health, eliminating those occupational risks that may worsen their state of health and, if this is not possible, adapting their post. For this purpose, after analyzing workplace risk, medical protocols are established which, by means of a series of tests, establish workers' aptitude for the performance of their tasks, or whether any aspect must be taken into account so that the work does not have adverse consequences for those performing it. A post may be adapted or a worker may even be relocated to another, risk-free workplace. [403-4] At Sacyr, 62.4% of all workers are represented by Health and Safety Committees (66% in 2022). These committees meet quarterly and are tasked, among other things, with improving occupational health and safety performance, updating risk assessments, introducing new hazards and establishing controls. There are also official agreements with trade unions that include health and safety clauses for construction projects in Spain. These agreements contain specific stipulations, articles, chapters and titles regarding occupational health and safety, and are compiled with the assistance of 535 prevention officers (786 in 2022) in countries with a large number of employees on the payroll. 223 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.3.5 Employee training regarding occupational health and safety [403-5] To guarantee and reinforce our preventive culture, Sacyr periodically runs training courses to enhance our employees' learning and awareness on aspects of health and safety. In 2023, the Health and Safety Department's training team oversaw a total of 61,761 training hours. This implied an investment of € 283,975 in Spain (-31.66%), of which €145,295.95 were subsidized (-56.63%). In addition, Sacyr provided a total of 4,292 training hours to 4,067 workers from collaborating companies. Our Management System has a procedure for communication, participation and consultation with workers that establishes the parameters for holding Health and Safety Committee meetings. Furthermore, at Sacyr we have other channels for participation such as a thematic channel for prevention on the Intranet, internal communications via e-mail and on-site notice boards. Jorge Chávez Airport

Terminal. Peru 7.3.6 Promoting employee health [403-6] Sacyr focuses on nurturing the health of its workers at all levels. For this purpose, in coordination with various departments, initiatives are rolled out to improve psychological well-being and promote emotional wellbeing, good nutrition and physical activity through our Sacyr Health program. In 2023 we included financial well-being as one of the pillars of this program. workers received occupational health and safety training Training hours 19,577 61,761 In 2023 Integrated Sustainability Report - 2023 224 7.3.7 Prevention and mitigation of the impacts on employee health and safety directly linked to commercial relations 7.3.8 Coverage of the occupational health and safety management system [403-7] Sacyr also takes the necessary measures to ensure that employees, contractors, suppliers and collaborators constitute an active part of our Health and Safety Policy. Accordingly, we have a specific procedure, "Procurement and contracting management" the main objectives of which are as follows:

- Assess contractors and suppliers in the pre-contract phases to ensure that they comply with the standards set by the Health and Safety Department.
- Ensure that subcontracted workers are fully informed about the risks to which they are exposed in their respective jobs and about the applicable protective and preventative measures.
- Ensure that subcontractors effectively shoulder their responsibilities, taking all necessary measures and providing their employees with the appropriate means to guarantee their safety.
- Assess contractors and suppliers in the final project phases to gauge their health and safety and health performance.

[403-8] [CRE6] The management system is implemented and certified to ISO 45001 under UKAS accreditation in 88 Group companies (15 more than in 2022), representing more than 64.76% of the Group based on the total headcount (70.7% in 2022). This percentage increases to 79.14% based on the total volume by revenues. Based on the figures for contractor workers, 59.15% of them are hired by companies holding this certification (95% in 2022). These figures are lower due to the company's divestment process in 2023. A total of 92 work centers involving 4,442 workers were internally audited, which means that 20.78% of the total workforce was sampled, while 52 work centers involving 2,368 workers (11.08%) were sampled for the external audit. With regard to subcontracted workers, 16.26% of the total workforce (2,929) was sampled, while 52 workplaces were sampled for the external audit, implying 969 workers (5.38%).

Americo Vespucio toll road. Chile 225 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 7.3.9 Occupational accident injuries and occupational illnesses and diseases [403-9] [403-10] Sacyr's efforts in the field of Occupational Health and Safety have led to significant progress in workplace quality, based on an internal scoring system that serves as an indicator to verify the status of each work center with respect to the fulfillment of our prevention obligations. Thanks to the involvement and commitment of Senior Management and the active engagement of employees, suppliers, contractors and collaborating companies, Sacyr manages to reinforce the safety culture needed to provide healthy and safe working conditions in our business. This is evidenced by the downward trend in accident rates over the past few years, a reflection of the fact that our Health and Safety Policy is wholly implemented. The result is that our accident frequency rate per 1,000,000 working hours of our own workers and collaborators has fallen to 8.27, a reduction of 37.8% with respect to 2022. We have also reduced the serious accident frequency rate per 1,000,000 working hours of our own employees by 25% compared to 2022. With regard to the serious accident rate of our subcontractors, there has been a slight increase in the frequency rate per 1,000,000 working hours, to 7.61, i.e. 1.5% higher than in 2022, there having been one fatality at one of our subcontractors. Sacyr conducted the usual accident investigations in response to these cases, analyzed the causes and took the necessary measures to prevent any recurrences. Accordingly, in 2022 Sacyr implemented an action plan to reduce and control serious and

fatal incidents called “0 Accidents”, consisting of: Creation of critical risk standards and internal audits on those standards in key projects. Approval and management of contractors. Development of specific KPIs for the components of the Plan. Monitoring of serious or potentially serious incidents. Oversight of Senior Management’s leadership activities. Specific training programs for Senior Executives, managers and supervisors. Integrated Sustainability Report - 2023 226 Our performance in 2023 Short term CHALLENGES Long term Medium term • Maintain the company's position with respect to its competitors and in the various sustainability and rating indices, through the continuous improvement of processes, compliance standards and the various certifications. • Adapt our occupational health and safety management system to a gender perspective. • Adapt and improve KPI reporting in accordance with the requirements of the various auditors, and with the needs of the company’s various departments. • Continue guaranteeing confidentiality in the management of individual health data. • Continue improving the health and safety culture. • A 10% increase in the number of our own employees working at companies certified in our Occupational Health and Safety Management System. • Continue obtaining recognition from external entities for the Sacyr Health program. • Lead our value chain in promoting health and well-being through the involvement and engagement of our contractors in the initiatives conducted by Sacyr in this sphere. • Achieve a 0 incident rate, prioritizing eliminating those classified as serious or fatal. • Improve the Sacyr Health program, with new initiatives more suited to the employees’ needs and interests. • Introduce occupational health and safety training and awareness plans in employee training itineraries that improve the preventive culture, not only for new recruits but also for existing employees. • Implement global health and well-being plans linked to SDG 3, identifying specific goals and monitoring them. • Join new programs or initiatives that evidence the company's commitment to health and well-being. • Improve the value chain by integrating safety in all company processes (design, offer, execution, and conservation and operation). • Design strategies aimed at improving road safety, not only of employees, but of the infrastructure we manage. • Measure the social impact of health and safety projects. • Incorporate new technologies through innovation projects to address the security challenges we face daily in our businesses. • Incorporate new technologies through innovation projects to improve the safety of the end users of our infrastructure. 227 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices • Intrama Human Digital Health Awards – Recognized as one of the TOP30 companies in Spain in terms of corporate well-being and emotional health best practices. • Madrid Regional Government Awards - for the promotion of sport by private enterprise. • Health and Business Award – Ranking Sacyr among the top 10 companies with the best initiatives in the field of occupational health, awarded by HR Digital. RECOGNITIONS • Extension of the Certification to ISO 45001 standard at the aforementioned companies (15 more than in 2022), which represents a 20.55% increase in the number of companies certified in our Occupational Health and Safety Management Systems, reaching 79.14% of revenues covered by this certification. • Increase the scope and tools of the SMART, occupational health and safety management system software, developing new functionalities and adapting it to the new Occupational Health and Safety Management System. • Implementation of a New preliminary contractor approval and assessment system (Agor@). • Improvement of the Sacyr Health Program. A program implementing activities that promote the well-being of employees within the company, covering a range of areas such as sports, food and emotional well-being. This program included initiatives such as: - Varying audiovisual content and in-person activities related to nutrition. - Relaxation and stress management workshops, as well as a range of audiovisual content on bullying, digital disconnection, relaxation and psychosocial risks and emotional well-being. - Sports challenges and the

second virtual race for Sacyr employees. - Increase in the number of sports activities offered at the Sports Club. - Physiotherapy and Back School at all centers. • Collaboration with third sector entities and organizations that work with key topics (CNC Sílice Cristalina, Aspanovas Foundation, etc.) • Improve the company's health and safety culture through the following actions: - Monthly health and safety campaigns on various topics. - Reward program for the contract with the best preventive culture. - Reward program for the individual with the best preventive culture. - Adherence to the Luxembourg Declaration, reinforcing Sacyr's commitment to well-being. - Medical service. • Continue implementing new projects in the "Safety Monitors" program in cooperation with third-sector entities and other organizations working on key issues. • Improve KPI reporting. • Reduce the Accident Frequency Rate. • Launch the critical point auditing program. • Increase senior management leadership visits.

ACCOMPLISHMENTS IN 2023 Integrated Sustainability Report - 2023 228 8 Positive Impact Ambition 229 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 8.1 Social value 232 8.2 Sacyr social footprint 238 8.3 Stakeholders 242 Integrated Sustainability Report - 2023 230 Stakeholders Facilitating agents throughout the value chain. Sacyr Social Footprint A proprietary model for measuring the impact of projects. Board of Directors Sustainability Committee Sustainability Operating Committee 8 Positive impact ambition Policies concerning sustainability Sustainability and Corporate Governance Committee Positive impacts are generated through three areas of action Social value Driven through the Sacyr Foundation, social and global volunteering actions. Positive impact-oriented governance 1 3 4 5 2 ESG Committees (Equality, Safety, 6 etc.) 231 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices From Sacyr's general strategy to our 21-25 Sacyr Sustainable Action Plan, above and beyond compliance. Global sustainable impact: P3 activity with a diversified backlog of transportation, social and green business infrastructure: 69 assets in more than 20 countries with €18 Bn of investments under management. Impact on the development of cities and regions through projects for: civil engineering works, building, turnkey/EPC energy. Long-term impact: young backlog with a remaining lifetime of 26 years. Impact on the supply chain: high percentage of local suppliers. Promoters of the 1st edition of the UN Global Compact "Training program: Sustainable suppliers" in Spain. Future impact: high growth potential and scope for increasing valuation. Vertical impact: specialist in greenfield projects that intervenes throughout the entire infrastructure value chain. Businesses aimed at generating positive impacts Strategy aimed at generating positive impacts Integrated Sustainability Report - 2023 232 8.1 Social value Sacyr helps improve the quality of life of the people in the communities where we are present by conducting our activities. This allows us to play a pivotal role in building a fairer and more sustainable and equal society. We are in an unmatched position to generate a meaningful contribution to economic and social development in the countries where we operate. To design our social responsibility and community relations plans, we open a dialog with our stakeholders concerning the most important topics that must inform our strategy and decisions. This helps us to identify our potential impacts, both positive and negative, and chart the role we want to play as social and economic actors. As a result of this dialog, we chart a social map of our projects' impact areas, and, through the foundations and third-sector associations in the region, we identify those communities' most acute socioeconomic and environmental needs. Furthermore, through the Sacyr Foundation we plan and manage how we can contribute to meeting those needs. The Sacyr Foundation, created in 2008, enables us to maximize the real, positive impact of the Group's activities by means of social, innovation and volunteering initiatives that benefit society and the environment, and to contribute more effectively

through our projects to the well-being and development of the communities in which we conduct our business. In keeping with Sacyr Foundations' successive plans, in 2023 we signed more than 70 partnership agreements with third sector entities, a commitment that materialized in contributions of more than €480,000. At Sacyr we also work with sporting organizations through sponsorships. Main LINES OF ACTION of the Sacyr Foundation: Children Emergencies Disability Healthcare assistance Volunteer work Environment Inclusion Innovation +65,000 Estimated Direct Beneficiaries +365,000 Estimated Indirect Beneficiaries +€900,000 Social investment 233 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices > Investment by axis > % Activities by line of action Innovation Awards Inclusion Healthcare assistance Disability Environment Children Emergencies Inclusion Healthcare assistance Children Disability Emergencies Environment Innovation > SDGs impacted by number of projects (%) > Weight of investment in SDGs (%) 26% 19% 18% 12% 9% 8% 7% 25% 21% 9% 1% 16% 21% 7% 1 2 3 4 5 6 7 10 8 11 12 13 15 16 17 1 2 3 4 5 8 7 15 16 11 12 14 6 10 13 17 1 3 4 10 12% 6% 11% 11% 5 13 2 8 10% 8% 6% 6% 17 6 7 15 6% 4% 3% 3% 16 11 12 14 3% 1% 1% 1% 1 4 17 3 14% 14% 11% 10% 13 2 6 10 10% 8% 6% 6% 5 8 7 15 5% 4% 2% 2% 11 12 16 1% 1% 1% Integrated Sustainability Report - 2023 234 Notable projects with Foundations in 2023: A toda Vela Foundation SPAIN Inclusive vacation options for people with intellectual and developmental disabilities. This initiative provides an alternative for leisure and social participation for people with cognitive diversity. Abracadabra Foundation The Health and Safety team took part in one of the 5 "Magic Therapy" workshops at a residential care facility for high-dependency people with intellectual disabilities carried out this year. Asociación Española contra el Cáncer- AECC This initiative consisted of an AECC charity bazaar at Sacyr headquarters at Condesa de Venadito 7. ATENPACE Foundation Project aimed at providing financial support for the association's postural control program for people with cerebral palsy. Amica Foundation Technological project consisting of placing technology at the service of people with disabilities supported by Amica to mitigate the existing digital divide. Asociación Aspanovas Thanks to the support and involvement of 200 Sacyr employees in the "Mi Estrella Viajera" challenge, the Sacyr Foundation was able to donate to Fundación Aspanovas in Bizkaia. Contigo Foundation Its mission is to promote ground-breaking research projects to help prevent and stop cancer among women. Donation for the charity dinner event "Cena Contigo" the proceeds of which are used for research into carcinomas. Freno al Ictus Foundation "Héroes en casa" collaboration and "weRSocial" conference. 10 Sacyr employees volunteered at schools to train 1,000 adolescents to spot stroke symptoms. Fundaz Paixena Foundation This is a non-profit healthcare organization aimed at the promotion of excellence in palliative care, in terms of training, service and research. NGO Ven con nosotros A Sacyr employee and their family take in Ukrainian children from orphanages and underprivileged families who visit Spain during the summer, and the Sacyr Foundation has joined this project. 235 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Bocalán Foundation We sponsor a service dog for people with ASD, reduced mobility or intellectual disabilities for 10 months. Emalaikat Foundation Improvement of water and sanitation infrastructure and health improvements in Lokwakipi, Kokuselei, Riokomor and Ekipetot areas, Kokuselei Valley, Turkana, Kenya. Humans Foundation Collaborative partnership to generally promote humanization processes in healthcare engineering and architecture. Inclusive Foundation Donation for paint, hoists, window security and economic aid for disabled users. Juan XXIII Foundation Contribution to kitchen facilities at the Hotel and Catering School. Manos de Ayuda Social Foundation Assistance in developing programs carried out in the soup kitchen: food, social care and employment

guidance. Lesionado Medular Foundation Grants for easier access to rehabilitation and health maintenance programs for people with spinal cord injuries who are at risk of socio-economic exclusion. Buceo Melilla Foundation In 2023, volunteers from the Sacyr Foundation took part in the ninth edition of the national litter collection on beaches and in the sea. Recover Foundation This is a collaboration requested by a Sacyr employee who took a training course with the EOI. It is a charity concert the proceeds of which will be used for research into cervical cancer in Cameroon. Mamás en Acción Foundation Proposal by an employee of Sacyr Construction for collaboration in carrying out activities to accompany children on their own in hospital, either because their families cannot be with them or because they are orphans. Integrated Sustainability Report - 2023 236 Food bank Another collaboration in the Christmas campaign to collect food and basic essentials for those most in need. Saving the Amazon We continued to contribute to the Amazon reforestation and the planting of a new company-sponsored forest, an initiative to improve the environment. Universidad de Navarra - Biodiversity We took part in the project aimed at training new generations of scientists to foster and promote our commitment to sustainability in society. We collaborated in the summer camp for users at risk of exclusion. Toda Ayuda Foundation International cooperation The members of the volunteer club spent a weekend refurbishing an International Cooperation center. Down Madrid Four activities were staged (horse riding, climbing wall, charity race and visit to Faunia) in support of the integration of people with Down syndrome. Eurofirms Foundation Volunteering with people with disabilities, staging an escape room activity in Madrid. Project Coach, devised to improve the employability of young people at risk of social and labor exclusion. Manantial Foundation They presented a project called #rayadas aimed at caring for the health and mental well-being of young people in the educational environment. Exit Foundation 237 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Colombia Improvement of educational institutions and recycling facilities (Buga). Water purification, septic system, electricity and waste management projects, as well as photovoltaic solar energy projects (Canal del Dique). Juegaterapia Reforesta A group of 15 volunteers from the Sacyr Foundation carried out reforestation activities in ecosystems on the Iberian Peninsula. Keeping company and entertaining children with cancer by enabling them to socialize outside the hospital. Family members of Sacyr employees can also take part in this volunteer program. Down Asturias Guided visit to the zoo "El Bosque", for 19 participants with intellectual disabilities, 10 Sacyr Proyecto employees in Asturias and 2 employees of Down Asturias Foundation. United Kingdom Collaboration with three foundations that provide comprehensive healthcare support in the UK. United States Collaboration in the educational environment through a scholarship program for students at the University of Idaho College of Engineering. Peru Education support and essential aid programs for vulnerable communities. Chile Construction of temporary housing in metropolitan Santiago with groups of 10 volunteers over two building days. International Integrated Sustainability Report - 2023 238 8.2 Sacyr social footprint Interaction with communities and assessment of the results of the various social initiatives implemented are the linchpin of Sacyr's Social Impact Model, one of the pillars of the Group's sustainability strategy. This model defines the role we want to play as agents for boosting local economies and grants us the social license to carry out our activities, which we call Sacyr's Social Footprint. Impact on communities [2-29] [3-3] [201-1] [413-1] The community relationship and impact models are designed based on the characteristics of the projects' impact areas and their population, through collaborative work and shared benefits that allow us to establish relationships of trust throughout the projects' life cycle. Accordingly, we strive to maintain the best relations with the various social actors: infrastructure users, communities in our projects' impact

areas, municipal authorities and educational institutions, among others. This is a process of ongoing dialog whereby we identify the most important issues that should drive our strategy and decisions, helping us to focus our company-wide ESG efforts on the pursuit of societal development and the sustainability of the planet. Developing these models has made us an environmentally responsible actor, mindful of our impacts, and of the social legitimacy that all our projects must have. In 100% of our projects, among other initiatives we implement local community engagement, impact assessments, and environmental and social development programs. Strategic focuses of social investment Education and training: Employability, career development and security linked to projects. Local economic development: Equipping the community, strengthening organizational aspects, fostering entrepreneurship and boosting productivity. Protecting and restoring the livelihoods of local communities. Promoting health, physical and emotional wellbeing, sports and culture. Strategic focuses of social impact Employment: Direct and indirect job creation Education: Training to improve the population's development opportunities Equality: Promoting equal opportunities and participation Diversity and integration: inclusion of people with disabilities, and gender, cultural and generational diversity. Social cohesion: Integration of citizens into their community, solidarity and coexistence. Territorial cohesion: Encouraging collaboration, generosity and close ties between territories.

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Setting up adequate communication and feedback channels with the stakeholders involved in our initiatives should provide clear and transparent information on the projects and their impacts at every stage of development. Stakeholders involved

Dimensions

Stages of the "Social Footprint" methodology

1. Institutional: Ministries, local authorities and governments, State agencies and forces.

2. Community: Organizations and associations, homeowner associations, professional guilds, lobbies, schools, foundations, NGOs and citizens.

1. Information: communicating with the community and other stakeholders about the project and its implementation.

2. Community management: bringing social value to the business strategy by linking with communities.

1. Determining the scope of calculation of the Social Footprint.

2. Quantifying the project context (pinpointing indicators).

3. Scaling at the activity level.

4. Methodological manual.

5. Roadmap

Diagnosis

Communication Proposal of r mi provement Assessment Institutional and community relations Management and soc ai l ni ves mt ent

- Stakeholder mapping
- Identification of ESG risks
- Identification of potential social impacts
- Measurement of impacts

CYCLICAL PHASES OF THE ENTIRE PROJECT

Responsibility and coherence

Clarity and transparency

D ai ol g and prox mi ty

Assessment and ex bi ility

Diversity and inclusion

PRINCIPLES TO BE TAKEN INTO ACCOUNT IN THE SOCIAL FOOTPRINT PROCESS

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240 Our stakeholders are different groups of people acting around common objectives. Sacyr's projects have a social impact on the lives of many people, which is why we keep them informed about the progress and developments of our activities, thereby ensuring a continuous relationship with the community. We use different tools to communicate with our stakeholders, including flyers, videos, personalized letters and dossiers. Sacyr's contact details are provided in all these media, so that if at any time someone has a suggestion or query, it can be solved as soon as possible. Contact with the communities is constant, through inperson meetings, informative meetings and visits. To evaluate our work in a particular area, we compile quantitative and qualitative information on the project. General impact assessment and measurement indicators

Periodic satisfaction surveys

No. of ESG investment projects

No. of dossiers, brochures and flyers delivered

No. of direct and indirect beneficiaries

No. of publications in the media

No. of direct and indirect jobs generated by the project or service

No. of visits to the website

No. of training hours for personnel involved in the project

No. of consultations, complaints and suggestions No. of training hours for employees and suppliers No. of responses delivered within the established deadline % of men and women workers No. of activities conducted No. of employees with disabilities No. of attendees at meetings and/or activities No. of towns in the project's impact area No. of volunteers and volunteer hours Cost of volunteering. Social impact measurement model results Sacyr's presence in more than 20 countries contributes to extensive social and economic development, in line with the scale of the projects that generate it. Measuring this contribution, and the different ways of carrying it out, allows us to obtain results that are then transformed into innovative improvement proposals for the design of subsequent projects. Sacyr's Social Footprint refers to the overall impact on society and the natural environment generated by developing our P3 projects. Purposes of modeling the project impact measurement Project focus 1. To drive the organization to be mindful of important social impact issues 2. In all businesses and countries 3. Generating a unique model 4. That allows social KPIs to be introduced in the various businesses and countries 5. Showcasing the opportunities that social vision can generate in the organization 1. Systematizing the measurement of social impact in the businesses and countries where Sacyr operates 2. Starting with pilot projects in two countries: Colombia and Chile 3. Generating a proprietary model 4. Creating capabilities in Sacyr's team for the model's global implementation The information we obtain from this measurement exercise is structured through indicators recognized by international standards and sustainability indexes that make it easier to compare and gauge the success of our projects. The external context and the different international regulatory environments are another aspect we consider when measuring our projects' impact. This measurement is aimed at providing relevant information for analysis and decision-making regarding the management of material topics for each Sacyr stakeholder group, as well as information that allows us to unlock the value of ESG efforts across all our actions: 241 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices +€900,000 +65,000 +365,000 +600 +11,000 Social investment Direct beneficiaries Indirect beneficiaries Volunteers Volunteer work hours Example of application of the social impact measurement model Social cashflow [201-1] The economic value generated in 2023 has enabled us to distribute wealth among our main stakeholders. Breakdown (million euros) Operating income 545 629 705 848 Divestments 227 94 94 107 Dividends received 119 79 24 8 Financial income 1,087 1,948 3,574 2,645 Economic value generated 1,978 2,750 4,397 3,608 2020 2021 2022* 2023 The distributed economic value in these communities in 2023 amounted to €3,656 million. Breakdown (million euros) Retained economic value – – – – Payments for investments 1,336 1,167 1,653 939 Financial payments 923 1,240 2,597 2,680 Dividend payments 34 20 39 37 Distributed economic value 2,293 2,427 4,289 3,656 2020 2021 2022* 2023 *Restated figures. Integrated Sustainability Report - 2023 242 Employees • Sacyr staff • Office employees • Construction work employees • Senior Management 8.3 Stakeholders [2-28] [2-29] At Sacyr, we consider stakeholders to be any social group that is or may be affected by the company's activity, now or in the future, and/or that legitimately affects or may affect the company's activity and, therefore, our results. We also categorize our stakeholders according to our contractual relationship with them, whether binding or sporadic: Community • Persons or entities that are affected by Sacyr's activity • People living in projects' impact areas • Neighborhood associations or pressure groups • NGOs and other non-profit entities • Government and public administrations • Media Environmental bodies • The physical and biological domain affected by Sacyr's work • Environmental protection organizations • Nature1 Suppliers • Companies that supply goods or services to Sacyr • Contractors Shareholders • Any person or entity holding shares in Sacyr • Institutional investors • Individual investors Binding contractual relationship: •

Employees • Analysts and investors • Shareholders • Customers • Suppliers and contractors Sporadic contractual relationship: • Media • Communities • Public administrations • NGOs and other civil society agents Sacyr's main stakeholders Customers • A person or entity that contracts projects and/or uses the services of Sacyr's various units • Public bodies • Consumers of our services • Local communities 1 We see nature as a non-participating stakeholder. We take into account relative environmental data in our business decision-making. Communication channels • Sustainability and Corporate Governance Committee • Sustainability Committee • Sacyr Foundation • Materiality analysis • Integrated Sustainability Report • Corporate policies • Sacyr Foundation's website • Social media • Intranet (MySacyr) • Sacyr Contigo app • Sacyr Life app • Sacyr Care app • Teams groups 243 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Transparency and dialog with stakeholders are paramount for developing and implementing our Strategic Plan and for our 2021-2025 Sacyr Sustainable Action Plan. • Communications between workers and company • Explora training channel • Advice and Complaint Line (whistleblowing channel) • Intranet (MySacyr) • ESG Committees • Volunteer initiatives • Code of Ethics and Conduct • Covid-19 and flu prevention and vaccination drives • Sports Club • Member of the Advisory Committee for certification of construction companies • Customer Service Program • Member of Spanish Chamber of Commerce • Member of AEN/CTN 198 Sustainability in Construction Committee • Member of the Spanish Road Technology Platform • Adherence to the United Nations Global Compact • Customer Service Program • Fixed and mobile service and consultation offices • Best practices with professional associations • Collaboration with foundations • Ecuador Principles • Partner to Forética and SERES Foundation • SEOPAN's Quality and Environmental Committees • Member of the Spanish Green Growth Group • Buy Green Recommendations Guide • Due diligence • Regulatory compliance • Advice and Complaint Line (whistleblowing channel) • ESG clause in contracts • ESG Training Itinerary • Annual General Meeting • Investor Day • Inclusion in ESG indices • E-mail for shareholders • Roadshows Commitment and engagement Individualized service: Sacyr's Investor Relations Department provides minority shareholders, investors, financial analysts and other stakeholders with a series of communication channels that allow for a direct and personalized relationship: Shareholders, analysts and investors > Phone line - shareholder desk 900.101.930 and investor desk 902.196.360 > Investor Relations section: <https://www.sacyr.com/en/shareholders-investors/general-information> > E-mail: accionistas@sacyr.com and ir@sacyr.com Visit us at www.sacyr.com Integrated Sustainability Report - 2023 244 In-person and online meetings, conference calls, roadshows, conferences and events: In 2023, the investor relations team held 771 meetings with investors and analysts, a 57% increase on 2022. 53% of these were meetings with analysts and 47% with investors, of which 71% were foreign and 29% domestic. Additionally, 25 Roadshows, Forums and Conferences were held, i.e. 25% more than in 2022. In 2023 an event was held with minority shareholders for the first time, to discuss the following topics: 1Q23 Results, Business Model, Strategy, Market Communications and Corporate Governance. It is worth highlighting the geographic diversity of Sacyr's investment interest, with a presence in countries such as the USA, the UK, France, Italy, Switzerland, Portugal, Germany and Spain, among others. Annual General Meeting: The AGM provides an excellent forum for exchanging information between the Company's directors and the shareholders representing the Company's capital. The directors provide information on the company's performance, its results, the main milestones achieved and expected, etc., while shareholders may request any information or clarifications they deem appropriate and may communicate any messages they wish to the directors. For more information: <https://www.sacyr.com/en/>

shareholders-investors/corporate-governance/ annual-general-meeting Sacyr's website (www.sacyr.com) contains all relevant corporate and financial information concerning the Company's performance, as well as all the information made public through the various financial reports and disclosures (Annual Report, quarterly results, etc.). In 2023 we sent 69 press releases to Spanish media outlets. We have published all of them on our corporate website in Spanish and English. In the Spanish digital and print media, 11,854 news items were published in which Sacyr was mentioned; of these, 98% were positive or neutral.

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Sacyr Contigo life • This software is for useful day-to-day tasks such as keeping up-to-date with the latest news. • Users of the app can learn about our activities and our professionals, the company's current affairs, innovation projects and our social and environmental sustainability initiatives. Sacyr Care • Software for tracking trips to risk areas. Employees: The heart of Sacyr At Sacyr we develop software to further connect with our employees, and the main Sacyr software available for download is: Integrated Sustainability Report - 2023

246 Online presence We are present in all social media. On YouTube we have posted 448 videos about the company, giving audiovisual visibility to all our business lines and all the work we do. We have made 309 Facebook posts, 743 tweets on X, 363 news items on LinkedIn, 135 short videos on TikTok and 751 Instagram posts about Sacyr. In total, we have posted 2,301 news items about the Group on social media.

743 posts 751 posts 363 posts 14,825 (+19%) followers 11,430 (+26%) followers 336,040 (+10%) followers X Instagram LinkedIn 309 posts 135 posts 448 posts 43,121 (+9%) followers 16,800 (+121%) followers 5,606 (+9%) followers Facebook TikTok YouTube

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Quality for our customers [3-3] [417-2] [417-3] Complaint mechanisms At Sacyr we address all claims, complaints or queries from any of our stakeholders. Various confidential and anonymous (if the informant so wishes) mechanisms are available for this purpose: • Sacyr Group Ethics Channel, in the section on Regulatory Compliance. • Internal environmental communication channel "EcoMunicate". • Through the projects themselves, which receive the concerns and complaints of the stakeholders affected by their operations. These tools are aligned with the Code of Ethics and Conduct, Policies and procedures of Sacyr's Integrated Management System, which allow all stakeholders to file complaints with the utmost confidence, integrity and transparency. In 2023, 13 communications pertaining to the Integrated Management System were handled (9 relating to service quality and 4 to environmental impact). The communications received were registered through the project managers. No claims were conveyed through the Ethics Channel. To find out about possible claims from other areas, see section 5.4.2 Ethics Channel of this report. All queries, complaints or claims were analyzed and dealt with appropriately, adopting all necessary measures to avoid, mitigate or remedy any negative impacts related to each issue. Currently 69% are closed and 31% are awaiting final resolution. In addition, 13 claims filed in previous years were closed in 2023. In 2023 there were no claims, fines or penalties in connection with labeling or failure to comply with laws or regulations regarding product sales or marketing communications, in any of the countries where products have been supplied. In this regard, where trademarks and badges are used, we are mindful of the regulations of the relevant certification bodies.

Customer satisfaction Customer satisfaction is a priority for Sacyr. Understanding and analyzing their insights and expectations is critical to the continuous improvement of our value proposition. Accordingly, in our surveys, we assess our customers' opinions on key aspects such as operational quality, responsiveness, ability to adapt to unforeseen events, their treatment by our professionals, and their level

of satisfaction with our service. We carry out these analyses periodically for all contracts. Our scores for the past three years are as follows: To ensure excellence in our projects, our goal is to exceed 4 points in customer satisfaction every year. 69% 31% > Type of complaints received 4.30/5 2021 4.20/5 2022 4.34/5 2023

Quality Environment Integrated Sustainability Report - 2023 248 9 Appendices 249 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Appendix II. Quantitative information 251 Appendix III. Traceability 278 Appendix IV. Reliability 296 Appendix I. About this Report 250 Integrated Sustainability Report - 2023 250 Appendix I. About this Report [2-2] [2-3] [2-4] [2-5] This is the eleventh integrated report published by Sacyr group. It refers to the year 2023 and presents the Group's position as of December 31, 2023. This document was drawn up in accordance with the standard published by the International Integrated Reporting Council (IIRC). It also conforms to the Global Reporting Initiative's standard, identifying the Sustainability Accounting Standards Board (SASB) indicators and the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and the Task Force on Nature-related Financial Disclosures (TNFD). Likewise, we meet the requirements of the European Union Taxonomy Regulation 2020/852. The information presented in this report is balanced, including the achievements attained during the year and the objectives set for the future. The Sacyr Group comprises Sacyr S.A. and its subsidiaries. For detailed information concerning the included companies, readers may consult the consolidation perimeter in the Consolidated Annual Financial Statements. It should be noted that the reference to "Sacyr" means the entire Group. With the aim of staying ahead of new reporting requirements, in this report the Sacyr Group addresses some of the new provisions introduced by the European Sustainability Reporting Standards (ESRS) through the new Corporate Sustainability Reporting Directive (CSRD), before its transposition into national law. With regard to financial reporting, we have followed the International Financial Reporting Standards (IFRS) adopted by the European Union. Furthermore, Sacyr's 2023 Integrated Sustainability Report, which is based on Law 11/2018 on Non-Financial Information and Diversity, is included in the company's 2023 Integrated Sustainability Report. This report has been externally verified by the independent entity PriceWaterhouseCoopers pursuant to the ISAE 3000 standard. Its financial content (Consolidated Annual Financial Statements of the Parent and its subsidiaries) has been verified by the same independent entity. In the interests of comparability and to evidence our commitment to transparency, quantitative data from previous years are stated as accurately as possible and in sufficient detail to meet stakeholders' expectations, without prejudice to the information provided in the previous year's report. In order to ensure reliability, the content of this Report has been reviewed by all internal departments and divisions responsible for managing the entity's stakeholders and for the information reported. In some cases, and generally owing to an absence of global data, the information contained in this report cannot refer to the Group overall. This circumstance is expressly stated in the relevant sections thereof. Nevertheless, Sacyr management aims to establish the necessary mechanisms to gradually eliminate these limitations to available information.

DEPARTMENT OF STRATEGY, INNOVATION AND SUSTAINABILITY OF SACYR, S.A. sostenibilidad@sacyr.com Calle Condesa de Venadito, 7, 28027, Madrid +34.91.545.50.00 Shareholder desk: 900 101 930 SUSTAINABILITY DEPARTMENT 251

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99 13 112 Brazil 321 191 512 392 200 592 Canada 13 5 18 15 5 20 Chile 3,409 2,088 5,497 3,075 1,344 4,419 Colombia 3,144 692 3,836 1,669 629 2,298 United States 638 81 719 538 70 608 Gibraltar 9 6 15 6 5 11 Ireland 15 2 17 16 2 18 Italy 14 2 16 15 4 19 Mexico 218 142 360 217 143 360 Oman 25 6 31 30 6 36 Panama 0 1 1 0 1 1 Paraguay 170 48 218 171 57 228 Peru 2,438 223 2,661 428 137 565 Portugal 430 69 499 447 66 513 Qatar 19 1 20 3 1 4 United Kingdom 50 18 68 43 21 64 Sweden 7 1 8 9 1 10 Uruguay 545 67 612 212 33 245 Total 25,406 19,223 44,629 11,280 4,249 15,529 Table based on workforce at December 31, 2023. There are no records of staff with non-guaranteed hours. 2022 2023 Integrated Sustainability Report - 2023 252 Number of employees by gender and nationality Gender Gender Nationality Men Women Total Men Women Total Afghanistan 0 1 1 0 0 0 Albania 0 1 1 0 0 0 Germany 2 2 4 0 1 1 Angola 1 1 2 2 0 2 Algeria 5 7 12 6 5 4 69 Argentina 16 22 38 9 8 17 Armenia 2 3 5 0 1 1 Bangladesh 4 0 4 0 0 0 Belgium 0 3 3 1 0 1 Bolivia 35 173 208 128 84 212 Bosnia and Herzegovina 0 1 1 0 0 0 Brazil 316 212 528 379 195 574 United Kingdom 22 6 28 24 9 33 Bulgaria 16 38 54 5 4 9 Cape Verde 3 3 6 2 2 4 Cameroon 4 5 9 0 0 0 Sri Lanka 1 0 1 0 0 0 Czech Republic 0 2 2 0 0 0 Chile 3,069 1,556 4,625 2,790 1,030 3,820 China 0 3 3 0 1 1 Colombia 3,217 1,073 4,290 1,714 795 2,509 Comoros 1 0 1 0 0 0 Congo (COG) 0 3 3 0 0 0 Congo (CAF) 0 2 2 0 0 0 Costa Rica 3 0 3 2 0 2 Croatia 2 0 2 1 0 1 Cuba 23 24 47 5 3 8 Dominican Republic 12 28 40 5 3 8 Dominica 9 19 28 1 0 1 Equatorial Guinea 0 3 3 0 0 0 Ecuador 53 161 214 16 16 32 Egypt 2 0 2 2 0 2 Spain 13,285 13,993 27,278 3,859 1,450 5,309 United States 99 18 117 526 70 596 Estonia 1 1 2 0 0 0 Philippines 0 3 3 0 2 2 France 5 2 7 2 0 2 Gambia 1 0 1 0 0 0 Georgia 1 0 1 0 0 0 Ghana 5 3 8 0 0 0 Grenada 1 0 1 0 0 0 Guatemala 0 1 1 0 0 0 Guinea (GIN) 5 21 26 0 0 0 Guinea (GNB) 1 0 1 1 0 1 Haiti 35 43 78 16 0 16 Netherlands 4 4 8 3 0 3 Honduras 7 95 102 0 0 0 2022 2023 253 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Gender Gender Nationality Men Women Total Men Women Total India 6 0 6 3 0 3 Iraq 0 1 1 0 0 0 Ireland 12 3 15 5 2 7 Italy 26 27 53 15 11 26 Jordan 0 1 1 0 1 1 Kenya 1 0 1 0 0 0 Lebanon 1 0 1 0 0 0 Lithuania 2 0 2 2 0 2 Macao 1 0 1 1 0 1 North Macedonia 0 3 3 0 1 1 Mali 12 3 15 0 0 0 Ivory Coast 1 0 1 0 1 1 Morocco 182 132 314 14 2 16 Mauritania 1 1 2 0 0 0 Mexico 216 146 362 220 144 364 Moldova 2 4 6 2 0 2 Mozambique 0 1 1 0 0 0 Nepal 2 0 2 0 0 0 New Caledonia 0 1 1 0 1 1 Nicaragua 3 32 35 1 0 1 Nigeria 1 14 15 0 0 0 Palestine 0 1 1 0 0 0 Panama 0 1 1 0 1 1 Pakistan 14 3 17 0 0 0 Paraguay 3 46 49 166 60 226 Peru 2,484 468 2,952 444 158 602 Poland 7 17 24 2 1 3 Portugal 429 97 526 436 72 508 Romania 88 180 268 21 15 36 Russia 3 11 14 2 0 2 El Salvador 3 11 14 1 1 2 Senegal 33 11 44 2 0 2 Syria 1 0 1 0 0 0 Somalia 2 0 2 0 0 0 Sweden 0 1 1 1 0 1 Tunisia 1 0 1 0 0 0 Ukraine 17 36 53 9 4 13 Uruguay 2 4 6 209 34 243 Venezuela 116 173 289 78 42 120 Serbia 0 0 0 1 0 1 Australia 0 0 0 46 10 56 Canada 0 0 0 8 3 11 Switzerland 0 0 0 3 1 4 Oman 0 0 0 29 6 35 Slovakia 0 0 0 1 0 1 Unknown nationality 1,466 258 1,724 0 0 0 Total 25,406 19,223 44,629 11,280 4,249 15,529 2022 2023 Integrated Sustainability Report - 2023 254 [405-1] Number of employees by gender Gender 2022 2023 Men 25,406 11,280 Women 19,223 4,249 Total 44,629 15,529 Table based on workforce at December 31, 2023. Number of employees by type of contract and hours 2022 2023 Contract type/Type of hours Full-time Part-time Total Full-time Part-time Total Permanent 26,478 7,268 33,746 12,695 379 13,074 Temporary 8,059 2,824 10,883 2,416 39 2,455 Total 34,537 10,092 44,629 15,111 418 15,529 There are a total of 13,074 employees with permanent contracts (33,746 in 2022) and 2,455 with temporary contracts (10,883 in 2022). There are 418 part-time employees (10,092 in 2022) and 15,111 full-time employees (35,537 in 2022). Number of employees by age range Age range 2022 2023 Under 30 years 5,428 2,688 30-50 years 22,262 8,774 Over 50 years 16,939 4,067 Total 44,629 15,529 Table based on workforce at December 31, 2023. Number of employees by professional category Professional category 2022 2023 Chair 1 1 Senior executives 88 78 Management 1,028 827 Skilled staff 4,085 3,535 Support

39,427 11,088 Total 44,629 15,529 Table based on workforce at December 31, 2023. 2022 2022 2022 2022 2023 2023 2023 2023 255 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 2022 2023 Contract type Permanent Temporary Permanent Temporary Countries / Gender Men Women Total permanent Men Women Total temp. General total Men Women Total permanent Men Women Total temp. General total Spain 11,894 11,988 23,882 1,848 3,569 5,417 29,299 3,475 1,395 4,870 300 102 402 5,272 Algeria 68 2 70 0 2 2 72 70 2 72 2 2 4 76 Australia 53 10 63 7 1 8 71 43 9 52 5 1 6 58 Belgium 5 0 5 0 0 0 5 0 0 0 0 0 0 0 0 Bolivia 3 0 3 63 8 71 74 2 0 2 97 13 110 112 Brazil 321 189 510 0 2 2 512 392 200 592 0 0 0 592 Canada 13 5 18 0 0 0 18 15 5 20 0 0 0 20 Chile 2,699 1,675 4,374 710 413 1,123 5,497 2,772 1,208 3,980 303 136 439 4,419 Colombia 2,374 613 2,987 770 79 849 3,836 1,270 494 1,764 399 135 534 2,298 United States 638 81 719 0 0 0 719 538 70 608 0 0 0 608 Gibraltar 9 6 15 0 0 0 15 6 5 11 0 0 0 11 Ireland 6 2 8 9 0 9 17 5 1 6 11 1 12 18 Italy 14 2 16 0 0 0 16 15 4 19 0 0 0 19 Mexico 129 88 217 89 54 143 360 153 105 258 64 38 102 360 Oman 20 4 24 5 2 7 31 22 4 26 8 2 10 36 Panama 0 0 0 0 1 1 1 0 0 0 0 1 1 1 Paraguay 143 45 188 27 3 30 218 128 50 178 43 7 50 228 Peru 56 20 76 2,382 203 2,585 2,661 50 26 76 378 111 489 565 Portugal 354 50 404 76 19 95 499 365 50 415 82 16 98 513 Qatar 19 1 20 0 0 0 20 3 1 4 0 0 0 4 United Kingdom 43 15 58 7 3 10 68 38 17 55 5 4 9 64 Sweden 7 1 8 0 0 0 8 9 1 10 0 0 0 10 Uruguay 72 9 81 473 58 531 612 46 10 56 166 23 189 245 General total 18,940 14,806 33,746 6,466 4,417 10,883 44,629 9,417 3,657 13,074 1,863 592 2,455 15,529 [2-7] Number of employees and contract types broken down by gender and region 2022 2023 Integrated Sustainability Report - 2023 256 Number of employees and type of hours broken down by gender and region 2022 2023 Type of hours Full-time Part-time Full-time Part-time Countries / Gender Men Women Total FullTime Men Women Total PartTime General total Men Women Total FullTime Men Women Total PartTime General total Spain 12,452 6,756 19,208 1,290 8,801 10,091 29,299 3,662 1,217 4,879 113 280 393 5,272 Algeria 68 4 72 0 0 0 72 72 4 76 0 0 0 76 Australia 60 11 71 0 0 0 71 48 10 58 0 0 0 58 Belgium 5 0 5 0 0 0 5 0 0 0 0 0 0 0 Bolivia 66 8 74 0 0 0 74 99 13 112 0 0 0 112 Brazil 320 191 511 1 0 1 512 391 200 591 1 0 1 592 Canada 13 5 18 0 0 0 18 15 5 20 0 0 0 20 Chile 3,409 2,088 5,497 0 0 0 5,497 3,073 1,323 4,396 2 21 23 4,419 Colombia 3,144 692 3,836 0 0 0 3,836 1,669 628 2,297 0 1 1 2,298 United States 638 81 719 0 0 0 719 538 70 608 0 0 0 608 Gibraltar 9 6 15 0 0 0 15 6 5 11 0 0 0 11 Ireland 15 2 17 0 0 0 17 16 2 18 0 0 0 18 Italy 14 2 16 0 0 0 16 15 4 19 0 0 0 19 Mexico 218 142 360 0 0 0 360 217 143 360 0 0 0 360 Oman 25 6 31 0 0 0 31 30 6 36 0 0 0 36 Panama 0 1 1 0 0 0 1 0 1 1 0 0 0 1 Paraguay 170 48 218 0 0 0 218 171 57 228 0 0 0 228 Peru 2,438 223 2,661 0 0 0 2,661 428 137 565 0 0 0 565 Portugal 430 69 499 0 0 0 499 447 66 513 0 0 0 513 Qatar 19 1 20 0 0 0 20 3 1 4 0 0 0 4 United Kingdom 50 18 68 0 0 0 68 43 21 64 0 0 0 64 Sweden 7 1 8 0 0 0 8 9 1 10 0 0 0 10 Uruguay 545 67 612 0 0 0 612 212 33 245 0 0 0 245 General total 24,115 10,422 34,537 1,291 8,801 10,092 44,629 11,164 3,947 15,111 116 302 418 15,529 2022 2023 257 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices 2022 2023 Contract type Permanent Temporary Permanent Temporary Professional category / Age Men Women Total temp. Men Women Total temp. General total Men Women Total perm. Men Women Total temp. General total Chair 1 0 1 0 0 0 1 1 0 1 0 0 0 1 Over 50 years 1 0 1 0 0 0 1 1 0 1 0 0 0 1 Senior executives 72 10 82 3 0 3 85 67 11 78 1 0 1 80 30-50 years 22 9 31 1 0 1 32 19 9 28 1 0 1 29 Over 50 years 50 1 51 2 0 2 53 49 2 51 0 0 0 51 Management 724 238 963 36 3 39 1,001 596 193 790 26 2 28 817 Under 30 years 2 2 4 0 0 0 4 2 1 3 0 0 0 3 30-50 years 456 189 645 22 1 23 668 353 147 500 14 1 15 515 Over 50 years 266 47 313 14 1 16 329 241 45 286 12 1 13 299 Skilled staff 1,940 1,117 3,057 690 239 928 3,985 1,901 1,075 2,975 382 167 549 3,524 Under 30 years 249 195 444 185 96 281 725 266 209 475

70 47 117 592 30-50 years 1,308 808 2,115 435 131 567 2,682 1,253 750 2,003 269 112 381 2,384 Over 50 years 383 115 497 69 12 81 578 382 116 498 44 8 51 549 Support 13,780 11,919 25,700 6,088 4,211 10,298 35,998 6,622 2,069 8,690 2,496 497 2,993 11,683 Under 30 years 1,517 698 2,214 1,509 702 2,211 4,425 1,118 432 1,549 642 162 805 2,354 30-50 years 6,927 4,698 11,625 3,453 2,163 5,615 17,241 3,466 1,138 4,603 1,456 272 1,728 6,331 Over 50 years 5,336 6,524 11,860 1,127 1,345 2,472 14,332 2,038 499 2,537 398 63 461 2,998 General total 16,517 13,285 29,802 6,816 4,452 11,268 41,070 9,187 3,347 12,534 2,906 666 3,572 16,106 Average annual number of permanent and temporary contracts by gender, age and professional category 2022 2023 Integrated Sustainability Report - 2023 258 2022 2023 Type of hours Full-time Part-time Full-time Part-time Professional category / Age Men Women Total FullTime Men Women Total PartTime General total Men Women Total FullTime Men Women Total PartTime General total Chair 1 0 1 0 0 0 1 1 0 1 0 0 0 1 Over 50 years 1 0 1 0 0 0 1 1 0 1 0 0 0 1 Senior executives 75 10 85 0 0 0 85 69 11 80 0 0 0 80 30-50 years 23 9 32 0 0 0 32 20 9 29 0 0 0 29 Over 50 years 52 1 53 0 0 0 53 49 2 51 0 0 0 51 Management 753 228 981 7 13 20 1,001 619 186 805 3 9 12 817 Under 30 years 2 2 4 0 0 0 4 2 1 3 0 0 0 3 30-50 years 474 179 652 4 12 16 668 366 139 505 1 9 10 515 Over 50 years 278 47 325 3 2 4 329 251 46 297 2 0 2 299 Skilled staff 2,612 1,264 3,876 17 92 109 3,985 2,273 1,191 3,463 10 51 61 3,524 Under 30 years 432 290 722 3 0 3 725 335 255 591 0 1 1 592 30-50 years 1,731 853 2,583 12 86 99 2,682 1,515 816 2,330 7 47 54 2,384 Over 50 years 450 121 571 2 5 7 578 423 120 543 3 4 6 549 Support 18,716 7,767 26,482 1,152 8,363 9,516 35,998 9,030 2,344 11,374 88 222 309 11,683 Under 30 years 2,861 957 3,817 164 444 608 4,425 1,739 554 2,293 21 40 61 2,354 30-50 years 9,889 3,466 13,355 490 3,395 3,886 17,241 4,896 1,285 6,181 26 124 150 6,331 Over 50 years 5,966 3,344 9,310 497 4,524 5,022 14,332 2,395 505 2,900 41 57 99 2,998 General total 22,157 9,269 31,426 1,176 8,468 9,645 41,070 11,992 3,732 15,723 101 281 383 16,106 Average annual number of full-time and part-time contracts by gender, age and professional category 2022 2023 259 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [405-2] Average remuneration by gender (€) Gender 2022 2023 Men 20,396.14 25,158.22 Women 17,680.15 20,485.27 Average remuneration by age (€) Age 2022 2023 Under 30 years 11,678.76 13,638.59 30-50 years 19,087.39 24,000.06 Over 50 years 21,544.93 30,378.44 Average remuneration by professional category (€) Professional category 2022 2023 Senior executives 172,477.74 179,865.60 Management 70,992.03 80,755.72 Skilled staff 30,429.04 33,934.28 Support 16,467.13 15,654.02 Wage gap adjusted by professional category Professional category 2022 2023 Senior executives 8.13% 8.14% Management 2.84% 4.63% Skilled staff 1.76% 1.39% Support 5.31% 4.00% Total gap 4.94% 3.45% The information relating to non-significant countries and employees with non-significant remuneration data is not taken into account due to the complexity and type of contracts (hourly contracts). The wage gap was calculated 1-W/M, expressed as a percentage. In order to obtain a value that jointly represents all employees in each professional category, factoring in the realities existing in each country and type of activities, the adjusted gap was calculated as shown in the table above, considering the theoretical remuneration. The criteria for calculating the adjusted gap were to consider the most representative countries that account for more than 96% of the workforce, weighting by equivalent jobs in each country, and additionally, eliminating some specific jobs in some countries, that are not filled by employees of both genders. Taking the employees of these countries together, without any segregation or weighting, the average remuneration of women divided by the average remuneration of men would give a gross wage gap of 16.1%. 2022 2022 2023 2023 2022 2023 2022 2023 Integrated Sustainability Report - 2023 260 [401-1] Detail of hires, dismissals and turnover 2022 Hires Dismissals Turnover Professional category / Age Men Women General total Men Women General total Men Women

General total Senior executives 2 0 2 4 0 4 0 0 0 Under 30 years 0 0 0 0 0 0 0 0 0 30-50 years 1 0 1 0 0 0 0 0 0 Over 50 years 1 0 1 4 0 4 0 0 0 Management 57 10 67 26 7 33 54 12 66 Under 30 years 0 0 0 0 0 0 0 1 1 30-50 years 41 9 50 13 5 18 44 10 54 Over 50 years 16 1 17 13 2 15 10 1 11 Skilled staff 726 390 1,116 187 70 257 365 179 544 Under 30 years 199 150 349 21 18 39 98 50 148 30-50 years 444 221 665 125 47 172 241 122 363 Over 50 years 83 19 102 41 5 46 26 7 33 Support 6,738 5,407 12,145 3,473 1,184 4,657 2,721 2,127 4,848 Under 30 years 1,729 1,067 2,796 850 324 1,174 917 542 1,459 30-50 years 3,565 2,777 6,342 1,866 582 2,448 1,418 1,056 2,474 Over 50 years 1,444 1,563 3,007 757 278 1,035 386 529 915 General total 7,523 5,807 13,330 3,690 1,261 4,951 3,140 2,318 5,458 2023 Hires Dismissals Turnover Professional category / Age Men Women General total Men Women General total Men Women General total Senior executives 2 0 2 3 0 3 2 0 2 Under 30 years 0 0 0 0 0 0 0 0 0 30-50 years 2 0 2 1 0 1 1 0 1 Over 50 years 0 0 0 2 0 2 1 0 1 Management 60 25 85 19 5 24 41 10 51 Under 30 years 1 0 1 0 0 0 0 1 1 30-50 years 37 19 56 8 5 13 29 8 37 Over 50 years 22 6 28 11 0 11 12 1 13 Skilled staff 580 367 947 131 67 198 256 136 392 Under 30 years 148 135 283 14 16 30 68 50 118 30-50 years 371 216 587 81 48 129 164 82 246 Over 50 years 61 16 77 36 3 39 24 4 28 Support 2,657 816 3,473 1,616 253 1,869 1,367 437 1,804 Under 30 years 734 283 1,017 396 76 472 444 184 628 30-50 years 1,372 437 1,809 806 143 949 743 215 958 Over 50 years 551 96 647 414 34 448 180 38 218 General total 3,299 1,208 4,507 1,769 325 2,094 1,666 583 2,249 261 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices [401-1] Turnover Turnover 2022 2023 Consolidated average headcount 41,070.43 16,106 Dismissals 10,409.00 4,343 [401-3] Number of times maternity / paternity leave taken in Spain Maternity Paternity Total Gender 2022 2023 2022 2023 2022 2023 Men 0 0 391 121 391 121 Women 187 44 0 0 187 44 General total 187 44 391 121 578 165 Only information for Spain reported. [401-3] Return rate after maternity / paternity leave Information on associations > Contributions made in 2023 Industry associations +€360,856.84 Communication +€33,309.73 Strategy and Innovation +€32,260.00 Technology +€27,480.00 Other +€19,533.37 Total +€473,439.94 Active Leave Total Gender 2022 2023 2022 2023 2022 2023 Men 380 104 11 17 391 121 Women 177 31 10 13 187 44 Total 557 135 21 30 578 165 Only information for Spain reported. 2022 2022 2022 2022 2022 2022 2022 2023 2023 2023 2023 2023 2023 2023 2023 Integrated Sustainability Report - 2023 262 Health and Safety Information The health and safety indicators are presented below: [403-9] [IF-EN-320a.1.] Accident data for own and subcontracted workers 2022 2023 %22/23 Own employees Subcontracted workers Own and subcontracted workers Own employees Subcontracted workers Own and subcontracted workers Own employees Subcontracted workers Own and subcontracted workers Number of deaths resulting from injury caused by occupational accident 0 1 1 0 1 1 - - - Frequency rate of deaths resulting from injury caused by occupational accident 0 0.02 0.01 0.00 0.03 0.01 - - - Number of work-related injuries with severe consequences 34 14 48 12 6 18 -64.7 -57.1 -62.5 Rate of work-related injuries with severe consequences 0.36 0.32 0.36 0.27 0.17 0.23 -25.0 -46.9 -34.3 Number of injuries per recordable occupational accident 1,514 332 1,846 386 274 660 -74.5 -17.5 -64.2 Number of hours worked 94,509,426 44,068,432 138,577,858 43,754,448 36,022,407 79,776,855 -53.7 -18.3 -42.4 Frequency rate of recordable work accidents 1 16 7.5 13.3 8.82 7.61 8.27 -44.9 1.5 -37.8 Frequency rate of recordable work accidents - P3 Projects 1 13.1 1.6 7.6 10.33 2.43 7.54 -21.1 51.9 -0.8 Frequency rate of recordable work accidents - Construction 1 11.6 9.1 10.3 8.08 8.97 8.53 -30.3 -1.4 -17.2 Frequency rate of recordable work accidents - Holding + Development 1 0 0 0 9.05 0.00 8.80 100 - 100 1 Frequency rate (LTIFR): (No. of work accidents with leave / No. of hours worked x 1,000,000). 2022 2023 %22/23 263 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest

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Most significant accident types

Accident type	2022	2023	Description	No. incidents	%	No. incidents	%
Moving worker collides with stationary object	785	42	222	33.7	Collision or blow against moving object	481	26
Other contact not classified	162	9	111	16.8	[403-10] Occupational diseases and illnesses	2022	2023

% 22/23 Gender

Own employees	Own and subcontracted workers	Own employees	Own and subcontracted workers
MSDs	ODs	Total	MSDs
ODs	Total	MSDs	ODs
Total	MSDs	ODs	Total

MSDs: Occupational accidents due to musculoskeletal disorders
ODs: Occupational diseases officially reported to mutual insurance companies or compensation systems
W: Women M: Men

[403-9] [IF-EN-320a.1.] Incident data by gender

	2022	2023	% 21/22	Gender	Men	Women	Total	Men	Women	Total
Number of accidents	1,036	478	1,514	338	48	386	-67.4	-90.0	-74.5	
Incidence rate ¹	3,093	3,159	3,114	2,074	15	945	81	1,806	20	
Frequency rate ²	15.7	16.7	16.0	10.11	4.65	8.82	-35.6	-72.2	-44.9	
Severity rate ³	0.43	0.49	0.45	0.31	0.13	0.26	-27.9	-73.5	-42.2	

The data reported in this table of work accidents, as well as their severity and frequency rates, refer to our own employees.

1 Incidence rate: (No. of work accidents / No. of workers x 100,000).
2 Frequency rate (LTIFR): (No. of work accidents with leave / No. of hours worked x 1,000,000).
3 Severity rate: (No. days lost / No. hours worked x 1,000).

Absenteeism

	2022	2023	Hours of absenteeism*
	10,371	1,066	80

* Hours calculated taking into account accidents at work, absence due to illness or unjustified absence.

2022 2023 2022 2023 2022 2023 2023 2023 %22/23 %22/23

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264 Information on the Environment

Further information on the 2023 environmental indicators by business area is presented below:

Materials used [301-1] > Materials used by weight or volume (t)

Engineering and Infrastructure	P3 Total
8,289,503.62	29,841.32
8,319,344.94	

Energy consumption [302-1] > Energy consumption within the organization (GJ)

Engineering and Infrastructure	P3 Total
1,205,424.52	2,493,451.57
3,698,876.09	

[302-2] > Energy consumption outside the organization (GJ)

Engineering and Infrastructure	P3 Total
100,596.95	34,305.70
134,902.65	

Water withdrawal [303-3] > Water withdrawal (ML) by source

Engineering and Infrastructure	P3 Total
Water from third parties	369.38
Drinking water	1,346.39
Recycled water	1,715.76
Surface water	369.38
Ground water	244.95
Sea water	614.32
Total	0.00

1,101.44
1,101.44
440.98
14.34
455.31
260.20
17.72
277.92
0.00
44.30
44.30
Total
1,070.55
1,422.74
2,493.29
265

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> Water withdrawal (ML) by source (in water-stressed areas)

Engineering and Infrastructure	P3 Total
Water from third parties	260.15
Drinking water	1,256.06
Recycled water	1,516.21
Surface water	260.15
Ground water	177.39
Sea water	437.53
Total	0.00

1,078.68
1,078.68
211.50
13.56
225.07
252.23
13.10
265.34
0.00
44.30
44.30
Total
723.88
1,327.03
2,050.91

Water discharged [303-4] > Destination of water discharged (ML)

Engineering and Infrastructure	P3 Total
Discharges to surface water	5.44
Discharges to groundwater	752.40
Discharges to sea water	757.84
Discharges to third parties	10.23
Total	26.38

36.61
1.72
44.26
45.98
Discharges to third parties
127.31
391.36
518.67
Total
144.70
1,214.40
1,359.10

Emissions [305-1] > Direct greenhouse gas emissions – t CO₂eq (Scope 1)

Engineering and Infrastructure	P3 Total
78,470.49	9,069.54
87,540.03	

Sacyr does not engage in emissions trading.

[305-2] > Indirect greenhouse gas emissions – t CO₂eq (Scope 2)

Engineering and Infrastructure	P3 Total
3,748.59	

256,092.71 259,841.30 > Purpose of discharged water (ML) (in water-stressed areas) Engineering and Infrastructure P3 Total Discharges to surface water 4.26 731.45 735.71 Discharges to groundwater 7.03 14.74 21.78 Discharges to sea water 0.00 31.49 31.49 Discharges to third parties 93.17 356.96 450.13 Total 104.47 1,134.64 1,239.11 Integrated Sustainability Report - 2023 266 Nitrogen oxides (NOx), sulfur oxides (SOx) and other significant air emissions [305-7] > NOX, SOX and other significant air emissions Engineering and Infrastructure P3 Total Electricity SO2 (t) 13.59 429.22 442.80 NOx (t) 12.45 393.32 405.77 CO (t) 3.84 121.33 125.17 NMVOC (t) 5.34 168.55 173.89 Particulates (t) 6.11 193.14 199.26 Vehicles, machinery and plant SO2 (t) 229.16 27.67 256.83 NOx (t) 426.44 50.50 476.94 CO (t) 233.51 29.58 263.09 NMVOC (t) 240.83 29.52 270.35 Particulates (t) 228.89 27.90 256.79 Customer satisfaction CDW NHW HW Total Engineering and infrastructure 2,564,263.38 7,305.81 433.86 2,572,003.05 P3 5,889.70 7,099.61 158.57 13,147.88 Total 2,570,153.08 14,405.42 592.43 2,585,150.93 Waste by type [306-3] > Total weight of waste by type (t) Engineering and Infrastructure P3 Total Customer satisfaction index 4.42 4.31 4.34 Scores go from 1 to 5, with 1 being the least favorable and 5 the most favorable. 267 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Certifications We continue to work to increase our certifications and, in 2023, we added the following: > Certifications within the framework of the Integrated Management System Certification Country Company ISO 9001 QUALITY MANAGEMENT SYSTEM AND ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM Spain Sacyr Operación y Servicios España S.A. Ireland Sacyr Ireland LTD. Algeria Skikda O&M Desalination Plant JV and Honaine O&M Desalination Plant JV. Brazil Sacyr Construcción S/A Do Brasil and Sacyr Concessões e Participações Do Brasil, Ltda (São Paulo). Colombia Sacyr Concesiones Colombia SAS (Desarrollo Vial Al Mar SAS). Chile Operadora Salud Siglo XXI. Paraguay Sacyr Concesiones Paraguay S.A. (Rutas Del Este, S.A. y Operadora Del Este). Canada Sacyr Canada INC. Australia Sacyr Infrastructure Pty Ltd and Sacyr Construction Australia PTY LTD. ISO 50001 CERTIFICATION ENVIRONMENTAL MANAGEMENT SYSTEM Spain Sacyr Operación y Servicios España S.A. Algeria SPA Aguas De Skikda and Skikda O&M Desalination Plant JV. Oman Sacyr Agua S.L. (Sohar Seawater Desalination Plant). ISO 14064 CARBON FOOTPRINT Spain Sacyr Agua S.A. SUSTAINABLE CANTEEN CERTIFICATION Spain Cafestore ISO 17025 TESTING AND CALIBRATION LABORATORIES Oman Sacyr Agua S.L. (Sohar Seawater Desalination Plant). ISO 19650 INFORMATION MANAGEMENT WHEN USING BIM (BUILDING INFORMATION MODELING) Spain Sacyr Construcción S.A. ISO 27001 INFORMATION SECURITY Spain EMMASA. Mexico Sacyr Concesiones México (Consortio Operador De Hospitales Regionales Del Sur – Hospital General Issste Tláhuac)). SA 8000 SOCIAL RESPONSIBILITY Spain Sacyr Construcción S.A. ISO 37001 ANTI-BRIBERY MANAGEMENT SYSTEMS Global Sacyr S.A. UNE 19601 CRIMINAL COMPLIANCE MANAGEMENT SYSTEMS Global Sacyr S.A. Certifications and accreditations issued by AENOR, SGS and ENAC are publicly available on their websites. Percentage of activities certified Engineering and Infrastructure P3 Total ISO 9001 94.25% 71.86% 83.40% ISO 14001 94.25% 71.86% 83.40% Integrated Sustainability Report - 2023 268 Financial year 2023 Substantial contribution criteria Economic activities Code(s) Turnover Proportion of Turnover 2023 Climate change mitigation Climate change adaptation Text Euros % Y; N; N/EL Y; N; N/EL A. TAXONOMY-ELIGIBLE ACTIVITIES A.1. Environmentally sustainable activities (Taxonomy-aligned) Electricity generation using solar photovoltaic technology CCM 4.1. +€1,269,849.97 0.03% Y N/EL Electricity generation from wind power CCM 4.3. +€17,836,963.89 0.39% Y N/EL Electricity generation from geothermal energy CCM 4.6. +€158,057.07 0.00% Y N/EL Electricity generation from bioenergy CCM 4.8. +€120,908.38 0.00% Y N/EL Transmission and distribution of electricity CCM 4.9. +€102,552.44 0.00% Y N/EL Construction, extension and operation of water collection,

treatment and supply systems CCM 5.1. +€39,470,949.84 0.86% Y N/EL Construction, extension and operation of waste water collection and treatment CCM 5.3. +€12,650,764.31 0.27% Y N/EL Collection and transportation of non-hazardous waste in source segregated fractions CCM 5.5. +€0.00 0.00% N/EL N/EL Anaerobic digestion of bio-waste CCM 5.7. +€0.00 0.00% N/EL N/EL Bio-waste composting CCM 5.8. +€41,805.36 0.00% Y N/EL Material recovery from non-hazardous waste CCM 5.9. +€0.00 0.00% N/EL N/EL Infrastructure for personal mobility, cycle logistics CCM 6.13. +€49,611,018.61 1.08% Y N/EL Infrastructure for rail transportation CCM 6.14. +€680,294,586.65 14.76% Y N/EL Infrastructure enabling low-carbon road transportation and public transportation CCM 6.15. +€31,037,042.97 0.67% Y N/EL Infrastructure enabling low carbon water transport CCM 6.16. +€15,078,353.01 0.33% Y N/EL Low carbon airport infrastructure CCM 6.17. +€208,049,379.68 4.51% Y N/EL Construction of new buildings CCM 7.1. +€487,230,851.27 10.57% Y N/EL Renovation of existing buildings CCM 7.2. +€8,612,272.97 0.19% Y N/EL Installation, maintenance and repair of energy-efficient equipment CCM 7.3. +€187,619.74 0.00% Y N/EL Installation, maintenance and repair of renewable energy technologies CCM 7.6. +€0.00 0.00% N/EL N/EL Data-driven solutions for GHG emissions reductions CCM 8.2. +€0.00 0.00% N/EL N/EL Close to market research, development and innovation CCM 9.1. +€0.00 0.00% N/EL N/EL Professional services related to energy efficiency of buildings CCM 9.3. +€0.00 0.00% N/EL N/EL Turnover from environmentally sustainable activities (Taxonomy-aligned) (A.1) +€1,551,752,976.17 33.66% 33.66% 0.00% Of which: enabling +€984,360,553.10 21.36% 21.36% 0.00% Of which: transitional +€8,612,272.97 0.19% 0.19% >

Table 1. Proportion of turnover from products or services associated with Taxonomy-aligned economic activities – disclosure for 2023 269 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Substantial contribution criteria Do no significant harm (DNSH) criteria Minimum safeguards Proportion of Taxonomyaligned turnover (A.1) or Taxonomyeligible turnover (A.2), 2022 Category enabling activity Category transitional activity Water and marine resources Pollution Circular economy Biodiversity and ecosystems Climate change mitigation Climate change adaptation Water and marine resources Pollution Circular economy Biodiversity and ecosystems Y; N; N/EL Y; N; N/EL Y; N; N/EL Y/N Y/N Y/N Y/N Y/N Y/N Y/N Y/N % F T N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.03% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.66% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.04% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.01% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 1.83% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 1.06% N/EL N/EL N/EL N/EL N N N N N Y 4.37% N/EL N/EL N/EL N/EL N N N N N Y 0.09% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.84% N/EL N/EL N/EL N/EL N N N N N Y 0.50% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 1.73% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 12.62% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.43% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.25% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 2.98% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 9.26% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% T N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% F N/EL N/EL N/EL N/EL N N N N N Y 0.01% F N/EL N/EL N/EL N/EL N N N N N Y 0.01% F N/EL N/EL N/EL N/EL N N N N N Y 0.00% F N/EL N/EL N/EL N/EL N N N N N Y 0.06% F 0.00% 0.00% 0.00% 0.00% Y Y Y Y Y Y 36.79% 0.00% 0.00% 0.00% 0.00% Y Y Y Y Y Y 17.59% F Y Y Y Y Y Y 0.00% T Integrated Sustainability Report - 2023 270 Financial year 2023 Substantial contribution criteria Economic activities Code(s) Turnover Proportion of Turnover in 2023 Climate change mitigation Climate change adaptation Text Euros % Y; N; N/EL Y; N; N/EL A.2 Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) EL; N/EL EL; N/EL Electricity generation from geothermal energy CCM 4.6. +€0.00 0.00% EL N/EL Construction, extension and operation of water collection, treatment and supply systems CCM 5.1. +€9,365,865.00 0.20% EL N/EL Construction, extension and operation of waste water collection and treatment CCM 5.3. +€1,060,374.59 0.02% EL N/EL Material recovery from non-

hazardous waste CCM 5.9. +€0.00 0.00% N/EL N/EL Operation of personal mobility devices, cycle logistics CCM 6.4. +€818,979.68 0.02% EL N/EL Infrastructure for personal mobility, cycle logistics CCM 6.13. +€2,297,074.62 0.05% EL N/EL Infrastructure for rail transportation CCM 6.14. +€22,681,116.29 0.49% EL N/EL Infrastructure enabling low-carbon road transportation and public transportation CCM 6.15. +€2,348,830,093.90 50.96% EL N/EL Infrastructure enabling low carbon water transport CCM 6.16. +€2,920,986.31 0.06% EL N/EL Low carbon airport infrastructure CCM 6.17. +€3,507,635.10 0.08% EL N/EL Construction of new buildings CCM 7.1. +€67,274,677.54 1.46% EL N/EL Renovation of existing buildings CCM 7.2. +€39,339.43 0.00% EL N/EL Installation, maintenance and repair of energy-efficient equipment CCM 7.3. +€2,136,025.89 0.05% EL N/EL Installation, maintenance and repair of renewable energy technologies CCM 7.6. +€1,456,533.84 0.03% EL N/EL Desalination CCA 5.13. +€80,990,945.74 1.76% N/EL EL Flood risk prevention and protection infrastructure CCA 14.2. +€41,668,042.43 0.90% N/EL EL Manufacture and installation of leak control technologies to reduce and prevent leaks in water supply networks and associated services WTR 1.1. +€921,192.16 0.02% N/EL N/EL Urban wastewater treatment WTR 2.2. +€83,694,178.48 1.82% N/EL N/EL Turnover from Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2) +€2,669,663,061.01 57.92% 53.42% 2.66% A. Turnover of Taxonomy-eligible activities (a.1+A.2) +€4,221,416,037.17 91.58% 87.09% 2.66% B. Taxonomy-non-eligible activities Turnover of Taxonomy-non-eligible activities +€388,012,763.02 8.42% TOTAL +€4,609,428,800.19 100.00% 271 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Substantial contribution criteria Do no significant harm (DNSH) criteria Minimum safeguards Proportion of Taxonomyaligned turnover (A.1) or taxonomyeligible turnover (A.2), 2022 Category enabling activity Category transitional activity Water and marine resources Pollution Circular economy Biodiversity and ecosystems Climate change mitigation Climate change adaptation Water and marine resources Pollution Circular economy Biodiversity and ecosystems Y; N; N/EL Y; N; N/EL Y; N; N/EL Y; N; N/EL Y/N Y/N Y/N Y/N Y/N Y/N Y/N % F T EL; N/EL EL; N/EL EL; N/EL EL; N/EL N/EL N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.56% N/EL N/EL N/EL N/EL 0.17% N/EL N/EL N/EL N/EL 0.15% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.19% N/EL N/EL N/EL N/EL 0.34% N/EL N/EL N/EL N/EL 44.80% N/EL N/EL N/EL N/EL -0.00% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 1.05% N/EL N/EL N/EL N/EL 0.02% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.00% EL N/EL N/EL N/EL 0.00% EL N/EL N/EL N/EL 0.00% 1.84% 0.00% 0.00% 0.00% 47.28% 1.84% 0.00% 0.00% 0.00% 84.06% Integrated Sustainability Report - 2023 272 > Table 2. Proportion of turnover/Total turnover Taxonomy-aligned per objective Taxonomy-eligible per objective (sub-index c, Template in Annex II, Delegated Regulation 2023/2486 Proportion of turnover/Total turnover Taxonomy-aligned per objective Taxonomy-eligible per objective CCM 33.66% 87.09% CCA 0.00% 2.66% WTR 0.00%* 1.84% CE 0.00%* 0.00% PPC 0.00%* 0.00% BIO 0.00%* 0.00% * In accordance with the Taxonomy legislation, alignment with these objectives has not been assessed in 2023. > Table 3. Proportion of CAPEX from products or services associated with Taxonomy-aligned economic activities – disclosure for 2023 Financial year 2023 Substantial contribution criteria Economic activities Code(s) CAPEX Proportion of CAPEX, 2023 Climate change mitigation Climate change adaptation Text Euros % Y; N; N/EL Y; N; N/EL A. TAXONOMY-ELIGIBLE ACTIVITIES A.1. Environmentally sustainable activities (Taxonomy-aligned) Electricity generation from wind power CCM 4.3. +€43,977.06 0.02% Y N/EL Electricity generation from geothermal energy CCM 4.6. +€422.66 0.00% Y N/EL Electricity generation from bioenergy CCM 4.8. +€116,317.35 0.04% Y N/EL Construction, extension and operation of water collection, treatment and supply systems CCM 5.1. +€3,707,913.78 1.32% Y N/EL Construction, extension

and operation of waste water collection and treatment CCM 5.3. +€736,890.79 0.26% Y N/EL Collection and transportation of non-hazardous waste in source segregated fractions CCM 5.5. +€0.00 0.00% N/EL N/EL Anaerobic digestion of bio-waste CCM 5.7. +€0.00 0.00% N/EL N/EL Bio-waste composting CCM 5.8. +€0.00 0.00% N/EL N/EL Material recovery from non-hazardous waste CCM 5.9. +€0.00 0.00% N/EL N/EL Infrastructure for personal mobility, cycle logistics CCM 6.13. +€0.00 0.00% N/EL N/EL Infrastructure for rail transportation CCM 6.14. +€18,891,352.15 6.73% Y N/EL Infrastructure enabling low carbon water transport CCM 6.16. +€0.00 0.00% N/EL N/EL Low carbon airport infrastructure CCM 6.17. +€14,400,300.88 5.13% Y N/EL Construction of new buildings CCM 7.1. +€222,945.20 0.08% Y N/EL Installation, maintenance and repair of energy-efficient equipment CCM 7.3. +€32,092.29 0.01% Y N/EL Installation, maintenance and repair of renewable energy technologies CCM 7.6. +€0.00 0.00% N/EL N/EL Data-driven solutions for GHG emissions reductions CCM 8.2. +€0.00 0.00% N/EL N/EL

273 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices > Table 4. Proportion of CAPEX/Total CAPEX Taxonomy-aligned per objective Taxonomy-eligible per objective (sub-index c, Template in Annex II, Delegated Regulation 2023/2486) Proportion of CAPEX/Total CAPEX Taxonomy-aligned per objective Taxonomy-eligible per objective CCM 13.6% 74.02% CCA 0.04% 0.16% WTR 0.00%* 4.21% CE 0.00%* 0.00% PPC 0.00%* 0.00% BIO 0.00%* 0.00% * In accordance with the Taxonomy legislation, alignment with these objectives has not been assessed in 2023. Substantial contribution criteria Do no significant harm (DNSH) criteria Minimum safeguards Proportion of Taxonomyaligned CAPEX (A.1) or Taxonomyeligible CAPEX (A.2), 2022 Category enabling activity Category transitional activity Water and marine resources Pollution Circular economy Biodiversity and ecosystems Climate change mitigation Climate change adaptation Water and marine resources Pollution Circular economy Biodiversity and ecosystems Y; N; N/EL Y; N; N/EL Y; N; N/EL Y; N; N/EL Y/N Y/N Y/N Y/N Y/N Y/N Y/N % F T N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.02% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.67% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.42% N/EL N/EL N/EL N/EL N N N N N N Y 2.69% N/EL N/EL N/EL N/EL N N N N N N Y 0.00% N/EL N/EL N/EL N/EL N N N N N N Y 0.22% N/EL N/EL N/EL N/EL N N N N N N Y 0.13% N/EL N/EL N/EL N/EL N N N N N N Y 1.86% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.25% F N/EL N/EL N/EL N/EL N N N N N N Y 0.02% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 2.18% F N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% N/EL N/EL N/EL N/EL Y Y Y Y Y Y 0.00% F N/EL N/EL N/EL N/EL N N N N N N Y 0.00% F N/EL N/EL N/EL N/EL N N N N N N Y 0.00% Integrated Sustainability Report - 2023 274 Financial year 2023 Substantial contribution criteria Economic activities Code(s) CAPEX Proportion of CAPEX, 2023 Climate change mitigation Climate change adaptation Text Euros % Y; N; N/EL Y; N; N/EL A. TAXONOMY-ELIGIBLE ACTIVITIES A.1. Environmentally sustainable activities (Taxonomy-aligned) Residential care activities CCA 12.1. +€0.00 0.00% N/EL N/EL CAPEX of environmentally sustainable activities (Taxonomy-aligned) (A.1) +€38,152,212.15 13.60% 13.60% 0.00% Of which: enabling +€33,323,745.32 11.87% 11.87% 0.00% Of which: transitional +€0.00 0.00% A.2 Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) EL; N/EL EL; N/EL Construction, extension and operation of water collection, treatment and supply systems CCM 5.1. +€1,476,228.43 0.53% EL N/EL Construction, extension and operation of waste water collection and treatment CCM 5.3. +€0.00 0.00% EL N/EL Material recovery from non-hazardous waste CCM 5.9. +€0.00 0.00% N/EL N/EL Infrastructure for personal mobility, cycle logistics CCM 6.13. +€0.00 0.00% N/EL N/EL Infrastructure for rail transportation CCM 6.14. +€78,999.89 0.03% EL N/EL Infrastructure enabling low-carbon road transportation and public transportation CCM 6.15. +€161,509,679.55 57.55% EL N/EL Low carbon airport infrastructure CCM 6.17. +€6,486,473.63 2.31% EL N/EL Construction of new buildings

CCM 7.1. +€4,727.54 0.00% EL N/EL Desalination CCA 5.13. +€57,248.95 0.02% N/EL EL Flood risk prevention and protection infrastructure CCA 14.2. +€269,674.89 0.10% N/EL EL Manufacture and installation of leak control technologies to reduce and prevent leaks in water supply networks and associated services WTR 1.1. +€17,239.88 0.01% N/EL N/EL Urban wastewater treatment WTR 2.2. +€11,796,177.24 4.20% N/EL N/EL CAPEX of Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2) +€181,696,450.02 64.75% 60.42% 0.12% A. CAPEX of eligible activities according to the taxonomy (A.1+A.2) +€219,848,662.17 78.34% 74.02% 0.12% B. Taxonomy-non-eligible activities CAPEX of Taxonomy-non-eligible activities +€60,781,337.83 21.66% TOTAL +€280,630,000.00 100.00% 275 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Substantial contribution criteria Do no significant harm (DNSH) criteria Minimum safeguards Proportion of Taxonomyaligned CAPEX (A.1) or Taxonomyeligible CAPEX (A.2), 2022 Category enabling activity Category transitional activity Water and marine resources Pollution Circular economy Biodiversity and ecosystems Climate change mitigation Climate change adaptation Water and marine resources Pollution Circular economy Biodiversity and ecosystems Y; N; N/EL Y; N; N/EL Y; N; N/EL Y; N; N/EL Y/N Y/N Y/N Y/N Y/N Y/N Y/N % F T N/EL N/EL N/EL N/EL N N N N N N Y 0.01% 0.00% 0.00% 0.00% 0.00% Y Y Y Y Y Y 8.49% 0.00% 0.00% 0.00% 0.00% Y Y Y Y Y Y 4.32% F N N N N N N N 0.00% T EL; N/EL EL; N/EL EL; N/EL EL; N/EL N/EL N/EL N/EL N/EL 0.84% N/EL N/EL N/EL N/EL 0.44% N/EL N/EL N/EL N/EL 0.01% N/EL N/EL N/EL N/EL 0.01% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 78.04% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.06% N/EL N/EL N/EL N/EL 0.00% N/EL N/EL N/EL N/EL 0.00% EL N/EL N/EL N/EL 0.00% EL N/EL N/EL N/EL 0.00% 4.21% 0.00% 0.00% 0.00% 79.39% 4.21% 0.00% 0.00% 0.00% 87.88% Integrated Sustainability Report - 2023 276 > Table 5. Proportion of OPEX from products or services associated with Taxonomy-aligned economic activities – disclosure for 2023 Financial year 2023 Substantial contribution criteria Economic activities Code(s) OPEX Proportion of OPEX, 2023 Climate change mitigation Climate change adaptation Text Euros % Y; N; N/EL Y; N; N/EL A. TAXONOMY-ELIGIBLE ACTIVITIES A.1. Environmentally sustainable activities (Taxonomy-aligned) OPEX of environmentally sustainable activities (Taxonomy-aligned) (A.1) N/A N/A N/A N/A Of which: enabling N/A N/A N/A N/A Of which: transitional N/A N/A EL; N/EL EL; N/EL OPEX of Taxonomy-eligible but not environmentally sustainable activities (not Taxonomy-aligned activities) (A.2) N/A N/A N/A N/A A. (OPEX) Taxonomy-eligible activities (A.1+A.2) N/A N/A N/A N/A B. TAXONOMY-NON-ELIGIBLE ACTIVITIES OPEX of Taxonomy-non-eligible activities N/A N/A TOTAL +€162,737.28 N/A > Table 6. Proportion of OPEX/Total OPEX Taxonomy-aligned per objective Taxonomy-eligible per objective (sub-index c, Template in Annex II, Delegated Regulation 2023/2486) Proportion of OPEX/Total OPEX Taxonomy-aligned per objective Taxonomy-eligible per objective CCM N/A N/A CCA N/A N/A WTR N/A N/A CE N/A N/A PPC N/A N/A BIO N/A N/A 277 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Substantial contribution criteria Do no significant harm (DNSH) criteria Minimum safeguards Proportion of Taxonomyaligned (A.1) or Taxonomyeligible (A.2) OPEX, 2022 Category enabling activity Category transitional activity Water and marine resources Pollution Circular economy Biodiversity and ecosystems Climate change mitigation Climate change adaptation Water and marine resources Pollution Circular economy Biodiversity and ecosystems Y; N; N/EL Y; N; N/EL Y; N; N/EL Y; N; N/EL Y; N; N/EL Y/N Y/N Y/N Y/N Y/N Y/N Y/N % F T N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A F N/A N/A N/A N/A N/A N/A N/A N/A T EL; N/EL EL; N/EL EL; N/EL EL; N/EL N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A > Table 7.

Nuclear energy and fossil gas activities Row Nuclear energy activities 1. The company carries out, funds or is otherwise exposed to research, development, demonstration and implementation of innovative power generation facilities that produce energy from nuclear processes that keep fuel cycle waste to a minimum. NO 2. The company carries out, funds or is otherwise exposed to the construction and safe operation of new nuclear facilities to produce electricity or process heat, including for urban heating or industrial processes such as hydrogen production, as well as their safety enhancements, harnessing cutting-edge technologies. NO 3. The company carries out, funds or is otherwise exposed to the safe operation of existing nuclear facilities that produce electricity or process heat, including for urban heating or industrial processes such as the production of hydrogen from nuclear energy, as well as their safety enhancements. NO Fossil gas activities 4. The company carries out, funds or is otherwise exposed to the construction or operation of electric power generation facilities that produce electricity from gaseous fossil fuels. NO 5. The company carries out, funds or is otherwise exposed to the construction, refurbishment and operation of hot/cold combined cycle and power generation facilities using gaseous fossil fuels. NO 6. The company carries out, funds or is otherwise exposed to the construction, refurbishment and operation of heat generation facilities that produced heat/cooling from gaseous fossil fuels. NO

Integrated Sustainability Report - 2023 278 Appendix III. Traceability Content Requirements Reference GRI GENERAL CONTENTS Business model Brief description of the Group's business model (business environment and organization). 1. Chairman's letter. 2.1 Business model. 2.2 Sacyr in the world. Appendix IV. Contact data. 2-1, 2-6, 2-22 Geographical presence. Markets in which it operates. Objectives and strategies. Main factors and trends that may affect its future performance. Materiality Materiality analysis. 3.5 Materiality analysis. 2-14, 2-29, 3-1, 3-2 Policies A description of the group's policies on these issues, including the due diligence procedures used to identify, assess, prevent and mitigate material risks and impacts and the verification and control procedures, including what measures have been taken. In each section. 2-23, 3-3 Results The results of these policies should include relevant nonfinancial key performance indicators to monitor and assess progress that enable comparability across companies and sectors, in accordance with the national, European or international reference frameworks used for each topic. In each section. 3-3 Risks The main risks relating to these matters associated with the Group's activities, including, when applicable and proportionate, its commercial relationships, products or services that may have a negative impact on these scopes, and how the Group manages these risks, explaining the procedures employed to detect them and assess them in line with the national, European and international frameworks of reference for each topic. Information must include the impacts detected, offering a breakdown of them, in particular the main risks in the short, medium and long term. 5.3 Risk management. 5.3.1 Integrated Risk Management System (IRMS). 5.3.2 Sacyr's main risks. 6.1. Our environmental commitment. 6.2.2. Management of risks and opportunities. 6.4.1.3 Management of risks and opportunities. 2-12, 2-24, 3-3, 201-2 ENVIRONMENTAL MATTERS Environmental management Current and foreseeable effects of the company's activities on the environment and, where appropriate, on health and safety. 6.1 Our environmental commitment. 3-3 Environmental assessment or certification processes. 6.1.2 Certifications. 6.5.1.1 Sustainable construction. 3-3, CRE8 Resources dedicated to the prevention of environmental risks. 6.1 Our environmental commitment. 6.1.3 Environmental expenditures and investments and regulatory compliance. 3-3, 2-27, 201-2 Application of the precautionary principle. 6.1 Our environmental commitment. 3-3 Amount of provisions and guarantees for environmental risks. 6.1.3 Environmental expenditures and investments and regulatory compliance. 6.2.2 Management of risks and opportunities. 3-3, 2-27, 201-2 Pollution Measures to prevent, reduce or remediate carbon emissions that seriously affect the environment; taking into account any form of

activity-specific air pollution, including noise and light pollution. 6.2.3.1 Mitigation. 6.4.1.4 Environmental contamination. Appendix II. Quantitative information. 3-3, 305-1, 305-2, 305-3, 305-4, 305-5, 305-6, 305-7 Circular economy and waste prevention and management Measures for prevention, recycling, reuse, other forms of recovery and disposal of waste. 6.3.1 Optimization of resources. 6.3.2 Waste prevention and management. 6.4.2.4.2 Effluents and discharges. Appendix II. Quantitative information. 3-3, 301-1, 301-2, 306-1, 306-2, 306-3, 306-4, 306-5, CRE5, 303- 1a, 303-2, 303-4 Actions to combat food waste. 6.3.4 Prevention and reduction of food waste. - Contents pursuant to Law 11/2018 on non-financial information and diversity 279 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Sustainable use of resources Water consumption and water supply in accordance with local constraints. 6.4.2 Sustainable water management. 6.4.2.4.1 Water uses. 6.4.2.4.2 Effluents and discharges. 6.5.2.2 Water saving. Appendix II. Quantitative information. 3-3, 303-1, 303-2, 303-3, 303-4, 303-5, CRE2 Consumption of raw materials. 6.3.1 Optimization of resources. Appendix II. Quantitative information. 301-1, 301-2 Measures taken to improve the efficiency of their use (raw materials). 6.3.1 Optimization of resources. 301-1, 301-2 Direct and indirect energy consumption. 6.2.4.1 Energy consumption. Appendix II. Quantitative information. 3-3, 302-1, 302-2, 302-3, 302-4, 302-5 Measures taken to improve energy efficiency. 6.2.3.1 Mitigation. 6.5.1.2 Energy efficiency. 3-3, 302-1, 302-2, 302-3, 302-4, 302-5, 305-5, CRE1, CRE3, CRE4 Use of renewable energy. 6.2.3.1 Mitigation. 6.2.4.1 Energy consumption. 6.2.4.2 Greenhouse gas emissions. 3-3, 302-1, 302-2, 302-3, 302-4, 302-5, 305-5 Climate change The main elements of greenhouse gas emissions generated as a result of the company's activities, including the use of the goods and services it produces. 6.2.4.2 Greenhouse gas emissions. Appendix II. Quantitative information. 3-3, 305-1, 305-2, 305-3, 305-4, 305-5, 305-6, 305-7, CRE3, CRE4 Measures taken to adapt to the consequences of climate change. 6.2.3 Strategy. 6.2.3.2 Adaptation. 201-2 The voluntary medium- and long-term reduction targets established to reduce greenhouse gas emissions and the means implemented to that end. 6.2.3 Strategy. 6.2.4.2 Greenhouse gas emissions. 3-3, 201-2, 305-1, 305-2, 305-3, 305-4, 305-5, 305-6, 305-7 Biodiversity protection Measures taken to preserve or restore biodiversity. 6.4.1.2.1 Identification and assessment of potential impacts. 6.4.1.2.2 Mitigation. 6.4.1.4.1 Protected areas. 6.4.1.4.2 Protected species. 6.4.1.4.3 Restoration and conservation of habitats. 3-3, 304-1, 304-2, 304-3, 304-4 Impacts caused by activities or operations in protected areas. 6.4.1.2.2 Mitigation. 6.4.1.4.1 Protected areas. 6.4.1.4.2 Protected species. 6.4.1.4.3 Restoration and conservation of habitats. 3-3, 304-1, 304-2, 304-3, 304-4 Content Requirements Reference GRI ENVIRONMENTAL MATTERS Integrated Sustainability Report - 2023 280 Content Requirements Reference GRI MATTERS CONCERNING THE WORKFORCE Employment Total number and distribution of employees by gender, age, country and professional category. 7.1.1 Description of the workforce. Appendix II. Quantitative information. 3-3, 2-7, 405-1 Total number and distribution of employment contract types. Appendix II. Quantitative information. 3-3, 2-7, 405-1 Average annual number of permanent contracts, temporary contracts and part-time contracts by gender, age and professional category. Appendix II. Quantitative information. 3-3, 2-7, 405-1 Number of dismissals by gender, age and professional category. Appendix II. Quantitative information. 401-1 Average remuneration and evolution thereof broken down by gender, age and occupational category or equal value. Appendix II. Quantitative information. 3-3, 2-21, 405-2 Wage gap. Appendix II. Quantitative information. 3-3, 405-2 Average remuneration of directors and executives, including variable remuneration, allowances, indemnities, payment to long-term savings schemes and any other payment broken down by gender. 5.1.6 Remuneration and incentives. The average remuneration of Senior Executives and non-executive Directors broken down by gender is €226,645 for

men (€212,545 in 2022) and €159,938 for women (€153,003 in 2022). Average remuneration includes fixed compensation, theoretical short-term variable compensation, theoretical long-term incentive (the cash portion), annualized life and medical insurance premiums. In calculating average remuneration, contributions to the social benefit plan were not taken into account as the profits have not been vested. It includes non-executive directors, senior management and other executives, except for the chief executive, whose remuneration is provided in note 36 to the Consolidated Annual Financial Statements, broken down by remuneration item, both for his executive duties and in his capacity as a director. 2-19, 2-20 Implementation of work disconnection policies. 7.1.4 Remuneration and benefits. 3-3, 401-2 Employees with disabilities. 7.2.2 People with disabilities. 405-1 Organization of work Organization of working hours. 7.1.4 Remuneration and benefits. 3-3, 401-2 Number of hours of absenteeism. Appendix II. Quantitative information. - Measures aimed at facilitating work/life balance and encouraging both parents to exercise it responsibly. 7.1.4 Remuneration and benefits. 3-3, 401-2 Mechanisms available to the company to promote the involvement of workers in the running of the company, in terms of information, consultation and engagement. 7.1.5 Labor relations. 281 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Content Requirements Reference GRI MATTERS CONCERNING THE WORKFORCE Health and safety Health and safety conditions at work. 7.3 Safety, health and well-being. 7.3.1 Occupational health and safety management system. 7.3.2 Identification of hazards, risk assessment and incident investigation. 7.3.3 Occupational health services. 7.3.4 Employee engagement and consultation and communication regarding occupational health and safety. 7.3.5 Worker training on occupational health and safety. 7.3.6 Promoting employee health. 7.3.7 Prevention and mitigation of the impacts on employee health and safety directly linked to commercial relations. 7.3.8 Coverage of the occupational health and safety management system. 7.3.9 Occupational accident injuries and Occupational illnesses and diseases. 3-3, 403-1, 403-2, 403-3, 403-4, 403-5, 403-6, 403-7, 403-8, 403-9, 403-10, CRE6 Number of work accidents by gender. Appendix II. Quantitative information. 403-9, 403-10 Frequency rate by gender. Appendix II. Quantitative information. 403-9, 403-10 Severity rate by gender. Appendix II. Quantitative information. 403-9, 403-10 Work-related illnesses. Appendix II. Quantitative information. 403-9, 403-10 Social relations Organization of social dialog, including procedures for informing, consulting and negotiating with staff. 7.1.5 Labor relations. 3-3, 2-30, 407-1 Percentage of employees covered by collective bargaining agreements by country. 7.1.5 Labor relations. 2-30 Balance of collective bargaining agreements, particularly in the field of occupational health and safety. 7.1.5 Labor relations. 7.3.4 Employee engagement and consultation and communication regarding occupational health and safety. 2-30 Training Policies implemented in the field of training. 5.4.1 Code of Ethics and Conduct. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 6.1.4 Environmental awareness. 7.3.5 Worker training on occupational health and safety. 7.1.2.3 Training. 3-3, 205-2, 403-5, 404-1, 404-2 Total number of training hours by professional category. 6.1.4 Environmental awareness. 7.1.2.3 Training. 3-3, 205-2, 403-5, 404-1, 404-2 Accessibility Universal accessibility for people with disabilities 7.2.2 People with disabilities. 3-3, 405-1 Equality Measures taken to promote equal treatment and opportunities between women and men. 7.2.1 Gender diversity. 3-3, 405-1 Equality plans (Chapter III of Spanish Organic Law 3/2007, of March 22, for effective equality of women and men). 7.2 Diversity, Equity and Inclusion. 7.2.1 Gender diversity. 3-3 Measures adopted to promote employment. 5.4.6 Human Rights Protection. 7.2 Diversity, Equity and Inclusion. 7.4.2 Talent acquisition, management and development. 3-3 Protocols against sexual and gender-based harassment; integration and universal accessibility for disabled people. 5.4.2 Ethics Channel. 7.2 Diversity,

Equity and Inclusion. 7.2.2 People with disabilities. 2-26, 3-3 Policy against all types of discrimination and, where appropriate, diversity management. 7.2 Diversity, Equity and Inclusion. 2-23, 3-3 Integrated Sustainability Report - 2023 282 Content Requirements Reference GRI HUMAN RIGHTS PROTECTION Due diligence Application of human rights due diligence procedures; and, where appropriate, measures to mitigate, manage and redress any abuses. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 5.4.6 Human Rights Protection. 5.5 Supply chain. 2-23, 2-25, 3-3, 408-1, 409-1, 410-1, 411-1 Prevention of risks of human rights breaches and, where appropriate, measures to mitigate, manage and redress any abuses. 5.4.6 Human Rights Protection. 2-25, 3-3, 408-1, 409-1, 410-1, 411-1 Basic conventions Promotion and enforcement of the provisions of the International Labour Organization's core conventions relating to respect for freedom of association and the right to collective bargaining; the elimination of discrimination in respect of employment and occupation; the elimination of forced or compulsory labor; the effective abolition of child labor. 5.4.6 Human Rights Protection. 7.1.5 Labor relations. 2-25, 3-3, 407-1 Reports of human rights breaches Reports of human rights breaches. 5.4.2. Ethics Channel. 2-25, 2-26, 3-3, 406-1, 411-1 CORRUPTION AND BRIBERY Corruption and bribery Measures adopted to prevent corruption and bribery. 5.4.3. Regulatory Compliance Model for Criminal Prevention and Fair Competition. 2-23, 2-26, 3-3, 205-1, 205-2, 205-3, 206-1 Money laundering Measures to combat money laundering. 5.4.4. Anti-money-laundering measures. 2-23, 2-26, 3-3 Contributions Contributions to foundations and non-profit entities. 8.1 Social value. 8.2 Sacyr social footprint. 201-1 COMPANY Sustainable development Impact of the Company's activity on employment and local development; and on local populations and the territory. 8.1 Social value. 8.2 Sacyr social footprint. 413-1 Relations with actors from local communities and the forms of dialog with them. 8.1 Social value. 8.2 Sacyr social footprint. 2-29, 413-1 Partnership or sponsorship actions. 6.1.1 Strategic partnerships. 8.1 Social value. 8.3. Stakeholders. 2-28 Subcontracting and suppliers Inclusion of social, gender equality and environmental issues in the procurement policy. 5.5.1 Sacyr's Responsible Supply Chain Management Model. 5.5.2 ESG risk analysis of our supply chain. 407-1, 408-1, 409-1 Consideration in relations with suppliers and subcontractors of their social and environmental responsibility. 5.5.1 Sacyr's Responsible Supply Chain Management Model. 5.5.2 ESG risk analysis of our supply chain. 407-1, 408-1, 409-1 Supervision and audit systems and their results. 5.5.3 Assessment and approval. 2-6, 3-3, 308-1, 308-2, 414-1, 414-2 Consumers Measures for consumer health and safety. 7.3 Safety, health and well-being. 8.3 Stakeholders: Quality for our customers. 3-3, 418-1 Claim systems, complaints received and their resolution. 8.3 Stakeholders: Quality for our customers. 3-3, 418-1 Tax Country-by-country profits. 5.7.2 Tax contribution. 207-4 Income tax paid. 5.7.2 Tax contribution. 207-4 Public subsidies received. 5.7.2 Tax contribution. 201-4, 207-4 283 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices GRI Content Index Content Location Related GRI sector standard Omission Reason Explanation GENERAL CONTENTS GRI 2: General contents 2021 2-1 Organizational details. 2.2 Sacyr in the world. Appendix IV. Contact data. 2-2 Entities included in the organization's sustainability reporting. Appendix I. About this Report. 2-3 Reporting period, frequency and contact point. Appendix I. About this Report. 2-4 Restatement of information. Appendix I. About this Report. 2-5 External assurance. Appendix I. About this Report. Appendix V. Reliability. 2-6 Activities, value chain and other business relationships. 2.1 Business model. 5.5 Supply chain. 2-7 Employees. 7.1.1 Description of the workforce. Appendix II. Quantitative information. 2-8 Workers who are not on payroll. - Information not available. There are no records of subcontracted staff. 2-9 Governance structure and composition. 5.1.1 Annual General Meeting. 5.1.2 Board of Directors. 5.1.3 Management Committee. 2-10 Nomination and

selection of the highest governance body. 5.1.2 Board of Directors. 2-11 Chair of the highest governance body. 5.1.2 Board of Directors. 2-12 Role of the highest governance body in overseeing the management of impacts. 5.1.2 Board of Directors. 5.3.1 Integrated Risk Management System (IRMS). 2-13 Delegation of responsibility for managing impacts. 5.1.1 Annual General Meeting. 5.1.2 Board of Directors. 5.1.5 Corporate Governance System. 2-14 Role of the highest governance body in sustainability reporting. 3.5 Materiality analysis. 5.1.2 Board of Directors. 5.1.5 Corporate Governance System. 2-15 Conflicts of interest. 5.1.5 Corporate Governance System. 2-16 Communication of critical concerns. 5.1.1 Annual General Meeting. 5.1.2 Board of Directors. 2-17 Evaluation of the performance of the highest governance body. 5.1.2 Board of Directors. 2-18 Evaluation of the performance of the highest governance body. 5.1.2 Board of Directors. 2-19 Remuneration policies. 5.1.6 Remuneration and incentives. 2-20 Process to determine remuneration. 5.1.6 Remuneration and incentives. 2-21 Annual total compensation ratio. - Confidentiality restrictions. This indicator is not reported since it refers to confidential information. 2-22 Statement on sustainable development strategy. 1. Chairman’s letter Statement of use Sacyr has reported in accordance with the GRI Standards for the period from January 1 to December 31, 2023. GRI 1 used GRI 1: Foundation 2021. GRI sector standard used G4 Integrated Sustainability Report - 2023 284 Content Location Related GRI sector standard Omission Reason Explanation GENERAL CONTENTS GRI 2: General contents 2021 2-23 Policy commitments. 5.4.1 Code of Ethics and Conduct. 5.4.2 Ethics Channel. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 5.4.4 Anti-money-laundering measures. 5.4.6 Human Rights protection. 6.1 Our environmental commitment. 2-24 Embedding policy commitments. 5.4.6 Human rights protection. 2-25 Processes to remediate negative impacts. 5.4.6 Human rights protection. 2-26 Mechanisms for seeking advice and raising concerns. 5.4.1 Code of Ethics and Conduct. 5.4.2 Ethics Channel. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 5.4.4 Anti-money-laundering measures. 2-27 Compliance with laws and regulations. 6.1.3.2 Regulatory compliance. 2-28 Membership associations. 6.1.1 Strategic partnerships. 8.3 Stakeholders. 2-29 Approach to stakeholder engagement. 3.5 Materiality analysis. 8.2 Sacyr social footprint. 8.3 Stakeholders. 2-30 Collective bargaining agreements. 7.1.5 Labor relations. MATERIAL TOPICS GRI 3: Material topics 2021 3-1 Process to determine material topics. 3.5 Materiality analysis. 3-2 List of material topics. 3.5 Materiality analysis. Economic performance GRI 3: Material topics 2021 3-3 Management of material topics. 5.7.1 Our tax model. 6.2 Climate change. 7.1 Professional development. 8.2 Sacyr social footprint. GRI 201: Economic performance 2016 201-1 Direct economic value generated and distributed. 8.2 Sacyr social footprint. 201-2 Financial implications and other risks and opportunities derived from climate change. 6.2.2.1 Transition risks and opportunities. 6.2.3.2 Adaptation. 201-3 Defined benefit plan obligations and other retirement plans. 7.1.4 Remuneration and benefits. 201-4 Financial assistance received from the government. 5.7.1 Our tax model. 5.7.2 Tax contribution. 285 Integrated Sustainability Report - 2023 1 Chairman’s letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Market presence GRI 3: Material topics 2021 3-3 Management of material topics. Not material. GRI 202: Market presence 2016 202-1 Ratios of standard entry level wage by gender compared to local minimum wage. Not material. 202-2 Proportion of senior management hired from the local community. Not material. Indirect economic impacts GRI 3: Material topics 2021 3-3 Management of material topics. Not material. GRI 203: Indirect economic impacts 2016 203-1 Infrastructure investments and services supported. Not material. 203-2 Significant indirect economic impacts. Not material. Procurement practices GRI 3: Material topics 2021 3-3 Management of material topics. Not material. GRI 204: Procurement practices 2016 204-1 Proportion

of spending on local suppliers. Not material. Anti-corruption GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.1 Code of Ethics and Conduct. 5.4.2 Ethics Channel. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 5.4.4 Anti-money-laundering measures. GRI 205: Anti-Corruption 2016 205-1 Operations assessed for risks related to corruption. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 205-2 Communication and training about anti-corruption policies and procedures. 5.4.1 Code of Ethics and Conduct. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. 205-3 Confirmed incidents of corruption and actions taken. 5.4.2 Ethics Channel. Criminal proceedings are underway involving several joint ventures for the construction of the high-speed rail line to Murcia, one of them belonging to Sacyr. In June 2021 an order was issued for commencing trial and in March 2022 the statements of defense were filed. No Sacyr Group company is criminally liable. Unfair competition GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.2 Ethics Channel. Integrated Sustainability Report - 2023 286 Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Unfair competition GRI 206: Anti-competitive behavior 2016 206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices 5.4.2 Ethics Channel. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. The Sacyr group is undergoing 3 administrative proceedings by the Spanish National Markets and Competition Commission (CNMC), which the Group has appealed before the National High Court. A favorable judicial ruling is expected in all of them as there has been no anti-competitive conduct: 1. Case in relation to the construction and rehabilitation of infrastructure and buildings sectors. In July 2020, the CNMC issued a ruling stating that these proceedings, which affect the main Spanish construction companies, had lapsed, and subsequently agreed to initiate new proceedings regarding the same facts. In view of the foregoing, a contentious-administrative appeal was filed before the National High Court. In July 2022, the CNMC Board notified the resolution of the case, putting an end to the administrative process. In October 2022, a contentious-administrative appeal against this ruling was filed before the National High Court, as it was considered contrary to the law on the basis of there being no anti-competitive practices on the part of Sacyr. Cautionary measures were requested and granted in November, suspending the effects of the ruling while the appeal is substantiated. 2. Case in connection with electrification maintenance of high speed lines. In this second case, Sacyr has filed an appeal against the CNMC ruling before the National High Court, which in 2020 allowed the appeal and agreed to suspend the enforceability of the CNMC ruling in question. 3. The third case refers to the market for state highway conservation and maintenance services. In August 2021, the CNMC Board issued a ruling putting an end to the administrative procedure. In October 2021, Sacyr filed a contentiousadministrative appeal before the National High Court, which in October 2022 upheld the cautionary measure requested. Sacyr considers that the ruling is contrary to the law, having demonstrated that there is no evidence of its having taken part in the alleged anti-competitive practices. Therefore, a favorable decision on the appeal is expected. Tax GRI 3: Material topics 2021 3-3 Management of material topics. 5.7.1 Our tax model. GRI 207: Tax 2019 207-1 Approach to tax. 5.7.1 Our tax model. 207-2 Tax governance, control, and risk management. 5.7.1 Our tax model. 207-3 Stakeholder engagement and management of concerns related to tax. 5.7.1 Our tax model. 207-4 Country-by-country reporting. 5.7.2 Tax contribution. 287 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Materials GRI 3: Material topics 2021 3-3 Management of material topics. 6.3 Circular economy. 6.3.2 Waste prevention and management. GRI 301: Materials 2016 301-1 Materials used by weight or volume. 6.3.1 Optimization

of resources. Appendix II. Quantitative information. 301-2 Recycled input materials used. 6.3.1 Optimization of resources. 301-3 Reclaimed products and their packaging materials. Given the nature of the products and services marketed by Sacyr, this indicator does not apply. Energy GRI 3: Material topics 2021 3-3 Management of material topics. 6.2 Climate change. 6.2.4.1 Energy consumption. CRE1 GRI 302: Energy 2016 302-1 Energy consumption within the organization. 6.2.4.1 Energy consumption. Appendix II. Quantitative information. CRE1 302-2 Energy consumption outside of the organization. 6.2.4.1 Energy consumption. Appendix II. Quantitative information. 302-3 Energy intensity. 6.2.4.1 Energy consumption. 302-4 Reduction of energy consumption. 6.2.3.1 Mitigation. 302-5 Reductions in energy requirements of products and services. 6.2.3.1 Mitigation. CRE1 Energy intensity in buildings. 6.5.2.1 Energy efficiency. Water and effluents GRI 3: Material topics 2021 3-3 Management of material topics. 6.4.2 Sustainable water management. CRE2 GRI 303: Waste and effluents 2018 303-1 Interactions with water as a shared resource. 6.4.2 Sustainable water management. 6.4.2.4.2 Effluents and discharges. CRE2 303-2 Management of water discharge-related impacts. 6.4.2.4.2 Effluents and discharges. 303-3 Water withdrawal. 6.4.2.4.1 Water uses. Appendix II. Quantitative information. 303-4 Water discharge. 6.4.2.4.2 Effluents and discharges. Appendix II. Quantitative information. 303-5 Water consumption. 6.4.2.4.1 Water uses. CRE2 Water intensity in buildings. 6.5.2.2 Water saving. Biodiversity GRI 3: Material topics 2021 3-3 Management of material topics. 6.4.1 Natural capital and biodiversity management. GRI 304: Biodiversity 2016 304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas. 6.4.1.4.1. Protected areas. 304-2 Significant impacts of activities, products, and services on biodiversity. 6.4.1.2.3 Most significant protection measures. 304-3 Habitats protected or restored. 6.4.1.4.3 Restoration and conservation of habitats. 304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations. 6.4.1.4.2 Protected species. Integrated Sustainability Report - 2023 288 Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Emissions GRI 3: Material topics 2021 3-3 Management of material topics. 6.2 Climate change. 6.2.4.2 Greenhouse gas emissions. 6.4.1.4 Environmental contamination. CRE3, CRE4 GRI 305: Emissions 2016 305-1 Direct (Scope 1) GHG emissions. 6.2.4.2 Greenhouse gas emissions. Appendix II. Quantitative information. CRE3, CRE4 305-2 Energy indirect (Scope 2) GHG emissions. 6.2.4.2 Greenhouse gas emissions. Appendix II. Quantitative information. 305-3 Other indirect (Scope 3) GHG emissions. 6.2.4.2 Greenhouse gas emissions. 305-4 GHG emissions intensity. 6.2.4.2 Greenhouse gas emissions. 305-5 Reduction of GHG emissions. 4.1 Key figures. 6.2.3.1 Mitigation. 6.2.4.2 Greenhouse gas emissions. 305-6 Emissions of ozone-depleting substances (ODS). 6.4.1.4 Environmental contamination. 305-7 Nitrogen oxides (NOX), sulfur oxides (SOX) and other significant air emissions. 6.4.1.4 Environmental contamination. Appendix II. Quantitative information. CRE3 Greenhouse gas emission intensity from buildings. 6.5.1.2 Energy efficiency. CRE4 Greenhouse gas emission intensity from new buildings and redevelopments. 6.5.1.2 Energy efficiency. Waste GRI 3: Material topics 2021 3-3 Management of material topics. 6.3 Circular economy. 6.3.2 Waste prevention and management. CRE5 GRI 306: Waste 2020 306-1 Waste generation and significant wasterelated impacts. 6.3.2 Waste prevention and management. CRE5 306-2 Management of significant waste-related impacts. 6.3.2 Waste prevention and management. 306-3 Waste generated. 6.3.2 Waste prevention and management. Appendix II. Quantitative information. 306-4 Waste not destined for disposal. 6.3.2 Waste prevention and management. 306-5 Waste destined for disposal. 6.3.2 Waste prevention and management. CRE5 Land recovered and in need of rehabilitation. 6.4.1.4 Environmental contamination. Supplier environmental assessment GRI 3: Material topics 2021 3-3 Management of material topics. 5.5 Supply chain. 5.5.3 Supplier assessment and approval. GRI 308: Supplier environmental assessment 2016

308-1 New suppliers that were screened using environmental criteria. 5.5.3 Supplier assessment and approval. 308-2 Negative environmental impacts in the supply chain and actions taken. 5.5.3 Supplier assessment and approval. 289 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Employment GRI 3: Material topics 2021 3-3 Management of material topics. 7.1 Professional development. 7.1.2 Talent acquisition, management and development. GRI 401: Employment 2016 401-1 New employee hires and employee turnover. Appendix II. Quantitative information. 401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees. 7.1.4 Remuneration and benefits. 401-3 Parental leave. Appendix II. Quantitative information. Incomplete information. Only information for Spain reported. Labor-management relations GRI 3: Material topics 2021 3-3 Management of material topics. - GRI 402: Labor-management relations 2016 402-1 Minimum notice periods regarding operational changes. The Sacyr group upholds the notice periods established in labor legislation or those provided in the collective bargaining agreements applicable to each business, having defined no minimum notice periods at the corporate level. Occupational health and safety GRI 3: Material topics 2021 3-3 Management of material topics. 7.3 Safety, health and well-being. CRE6 GRI 403: Occupational health and safety 2018 403-1 Occupational health and safety management system. 7.3 Safety, health and well-being. 7.3.1 Occupational Health and Safety Management System. CRE6 403-2 Hazard identification, risk assessment, and incident investigation. 7.3.2 Identification of hazards, risk assessment and incident investigation. 403-3 Occupational health services. 7.3.3 Occupational health services. 403-4 Worker participation, consultation, and communication on occupational health and safety. 7.3.4 Employee engagement and consultation and communication regarding occupational health and safety. 403-5 Worker training on occupational health and safety. 7.3.5 Worker training on occupational health and safety. 403-6 Promotion of worker health. 7.3.6 Promoting employee health. 403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships. 7.3.7 Prevention and mitigation of the impacts on employee health and safety directly linked to commercial relations. 403-8 Workers covered by an occupational health and safety management system. 7.3.8 Coverage of the occupational health and safety management system. 403-9 Work-related injuries. 7.3.9 Occupational accident injuries and occupational illnesses and diseases. Appendix II. Quantitative information 403-10 Work-related ill health. 7.3.9 Occupational accident injuries and occupational illnesses and diseases. Appendix II. Quantitative information. CRE6 Percentage of the organization operating in verified compliance with an internationally recognized health and safety management system. 7.3.8 Coverage of the occupational health and safety management system. Integrated Sustainability Report - 2023 290 Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Training and education GRI 3: Material topics 2021 3-3 Management of material topics. 7.1.2.2 Talent management and development. 7.1.2.3 Training. GRI 404: Training and education 2016 404-1 Average hours of training per year per employee. 7.1.2.3 Training. 6.1.4 Environmental awareness. 404-2 Programs for upgrading employee skills and transition assistance programs. 7.1.2.3 Training. 7.2.4 Generational diversity. 404-3 Percentage of employees receiving regular performance and career development reviews. 7.1.2.2 Talent management and development. Diversity and equal opportunities GRI 3: Material topics 2021 3-3 Management of material topics. 7.2 Diversity, equity and inclusion. GRI 405: Diversity and equal opportunities 2016 405-1 Diversity of governance bodies and employees. 5.1.2 Board of Directors. 7.1.1 Description of the workforce. 7.2.2 People with disabilities. Appendix II. Quantitative information. 405-2 Ratio of basic salary and remuneration of women

to men. Appendix II. Quantitative information. Only remuneration data is provided, not basic salary. Non-discrimination GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.2 Ethics Channel. GRI 406: Non-discrimination 2016 406-1 Incidents of discrimination and corrective actions taken. 5.4.2 Ethics Channel. Freedom of association and collective bargaining GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.6 Human rights protection. 7.1.5 Labor relations. GRI 407: Freedom of association and collective bargaining 2016 407-1 Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk. 5.4.6 Human Rights protection. 5.5.1 Sacyr's Responsible Supply Chain Management Model. 7.1.5 Labor relations. Child labor GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.6 Human rights protection. GRI 408: Child labor 2016 408-1 Operations and suppliers at significant risk for incidents of child labor. 5.4.6 Human rights protection. 5.5.1 Sacyr's Responsible Supply Chain Management Model. Forced or compulsory labor GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.6 Human rights protection. GRI 409: Forced or compulsory labor 2016 409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor. 5.4.6 Human rights protection. 5.5.1 Sacyr's Responsible Supply Chain Management Model. 291 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Security practices GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.8 Security personnel trained in human rights procedures. GRI 410: Security practices 2016 410-1 Security personnel trained in human rights policies or procedures. 5.4.8 Security personnel trained in human rights procedures. Rights of indigenous peoples GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.6 Human rights protection. GRI 411: Rights of indigenous peoples 2016 411-1 Incidents of violations involving rights of indigenous peoples. 5.4.2 Ethics Channel. 5.4.6 Human rights protection. Local communities GRI 3: Material Topics 2021 3-3 Management of material topics. 8.2 Sacyr social footprint. GRI 413: Local communities 2016 413-1 Operations with local community engagement, impact assessments, and development programs. 8.2 Sacyr social footprint. 413-2 Operations with significant actual and potential negative impacts on local communities. No significant negative impacts on local communities were recorded during 2023 through established reporting mechanisms. Supplier social assessment GRI 3: Material topics 2021 3-3 Management of material topics. 5.5 Supply chain. 5.5.3 Supplier assessment and approval. GRI 414: Supplier social assessment 2016 414-1 New suppliers that were screened using social criteria. 5.5.3 Supplier assessment and approval. 414-2 Negative social impacts in the supply chain and actions taken. 5.5.3 Supplier assessment and approval. Public policy GRI 3: Material topics 2021 3-3 Management of material topics. 8.3 Stakeholders. GRI 415: Public policy 2016 415-1 Political contributions. Sacyr does not make contributions to political parties and/or representatives. Customer health and safety GRI 3: Material topics 2021 3-3 Management of material topics. Not material. GRI 416: Customer health and safety 2016 416-1 Assessment of the health and safety impacts of product and service categories. Not material. 416-2 Incidents of non-compliance concerning the health and safety impacts of products and services. Not material. Integrated Sustainability Report - 2023 292 Content Location Related GRI sector standard Omission Reason Explanation MATERIAL TOPICS Marketing and labeling GRI 3: Material topics 2021 3-3 Management of material topics. 6.1.2 Certifications: Product labels. CRE8 GRI 417: Marketing and labeling 2016 417-1 Requirements for product and service information and labeling. 6.1.2 Certifications: Product labels. CRE8 417-2 Incidents of non-compliance concerning product and service information and labeling. 8.3 Stakeholders: Quality for our customers. 417-3 Incidents of non-compliance concerning marketing communications. 8.3 Stakeholders: Quality for

our customers. CRE8 Type and number of sustainability certifications, ratings and labeling schemes for new constructions, management, occupancy and redevelopment. 6.5.1.1 Sustainable construction. Customer privacy GRI 3: Material topics 2021 3-3 Management of material topics. 5.4.5 Personal data protection. GRI 418: Customer privacy 2016 418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data. In 2023, there were no complaints or incidents in this regard. APPLICABLE GRI SECTOR STANDARD TOPICS CONSIDERED NON-MATERIAL Topic Explanation CRE7 Number of people voluntarily and involuntarily displaced and/or resettled by development, broken down by project No relevant impacts were identified in this area. Tangua-Pasto. C. Unión del Sur. Colombia 293 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices SASB content index Code Content Reference ENVIRONMENTAL EFFECTS OF PROJECT DEVELOPMENT IF-EN-160a.1 Number of non-compliances with environmental permits, standards and regulations. 6.1.3.2 Regulatory compliance. IF-EN-160a.2 Analysis of processes for assessing and managing environmental risks associated with project design, location and construction. 6.1 Our environmental commitment. STRUCTURAL INTEGRITY AND SAFETY IF-EN-250a.1 Amount of defect- and safety-related rework costs. Not reported. IF-EN-250a.2 Total amount of monetary losses as a result of legal proceedings associated with defect- and safety-related incidents. Not reported. WORKFORCE HEALTH AND SAFETY IF-EN-320a.1 (1) Total recordable incident rate (TRIR). Appendix II. Quantitative information. IF-EN-320a.1 (2) Fatality rate of a) direct employees and b) contract employees. Appendix II. Quantitative information. LIFE CYCLE IMPACTS OF BUILDINGS AND INFRASTRUCTURE IF-EN-410a.1 (1) Number of commissioned projects certified to a third-party multi-attribute sustainability standard. 6.5.1.1 Sustainable construction. IF-EN-410a.1 (2) Active projects seeking such certification. 6.5.1.1 Sustainable construction. IF-EN-410a.2 Discussion of process to incorporate operational-phase energy and water efficiency considerations into project planning and design. 6.5.1.1 Sustainable construction. CLIMATE IMPACTS OF BUSINESS MIX IF-EN-410b.1 Amount of backlog for (1) hydrocarbon related projects and (2) renewable energy projects. 2.1 Business model. IF-EN-410b.2 Amount of backlog cancellations associated with hydrocarbon-related projects. Not applicable. IF-EN-410b.3 Amount of backlog for non-energy projects associated with climate change mitigation. 2.1 Business model. BUSINESS ETHICS IF-EN-510a.1 (1) Number of active projects. 2.1 Business model. 4.2. Performance of the Sacyr Group in 2023. IF-510a.1 (2) Order backlog in the 20 lowest-ranking countries on Transparency International's Corruption Perceptions Index. Not reported. IF-510a.2 Total amount of monetary losses as a result of legal proceedings associated with charges of (1) bribery or corruption and (2) anticompetitive practices. Appendix III. Traceability. IF-510a.3 Description of policies and practices for prevention of (1) bribery and corruption, and (2) anti-competitive behavior in the project bidding processes. 5.4.3 Regulatory Compliance Model for Criminal Prevention and Fair Competition. ACTIVITY PARAMETER IF-EN-000.A Number of active projects. 2.1 Business model. IF-EN-000.B Number of commissioned projects. 2.1 Business model. IF-EN-000.C Total backlog. 4.2 Sacyr Group performance in 2023. Integrated Sustainability Report - 2023 294 Contents according to the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) TCFD Recommendations Reference GOVERNANCE a) Describe the board's oversight of climate-related risks and opportunities. 6.2.1 Governance b) Describe the role of management in assessing and managing climate-related risks and opportunities. 6.2.1 Governance STRATEGY a) Describe the climate-related risks and opportunities it has identified in the short, medium and long term 6.2.3 Strategy b) Describe the impact of climate-related risks and opportunities on the organization's business model, strategy and financial planning 6.2.3 Strategy c) Describe the resilience of

the organization's strategy, taking into account different scenarios, including a 2°C or lower scenario. 6.2.3 Strategy RISK MANAGEMENT a) Describe the organization's processes for identifying and assessing climate-related risks 6.2.2 Management of risks and opportunities b) Describe the organization's processes for managing climate-related risks 6.2.2 Management of risks and opportunities c) Describe how the processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management 6.2.2 Management of risks and opportunities METRICS AND OBJECTIVES a) Disseminate the metrics used by the organization to assess climate-related risks and opportunities in line with its risk management strategy and processes 6.2.3 Strategy 6.2.4 Metrics and objectives b) Disseminate Scope 1 and 2, and if necessary, Scope 3 greenhouse gas (GHG) emissions and related risks 6.2.4.2 Greenhouse gas inventory c) Describe the objectives used by the organization to manage climate and performance-related risks and opportunities and performance against them. 6.2.3 Strategy 6.2.4 Metrics and objectives Villarrica Hospital. Chile 295 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Contents according to the recommendations of the Taskforce on Nature-related Financial Disclosures (TNFD) TNFD Recommendations Reference GOVERNANCE a) Describe the board's oversight of nature-related dependencies, impacts, risks and opportunities. 6.4.1.1 Governance. b) Describe the role of management in assessing and managing nature-related dependencies, impacts, risks and opportunities. 6.4.1.1 Governance. c) Describe the organization's human rights policies and engagement activities, and oversight by the board and management, with respect to Indigenous Peoples, Local Communities, affected and other stakeholders, in the organization's assessment of, and response to, nature-related dependencies, impacts, risks and opportunities. 5.4.6 Human rights protection. 6.4.1.1 Governance. STRATEGY a) Describe the nature-related dependencies, impacts, risks and opportunities the organization has identified over the short, medium and long term. 6.4.1.2 Natural Capital Action Plan. b) Describe the effect nature-related dependencies, impacts, risks and opportunities have had on the organization's business model, value chain, strategy and financial planning, as well as any transition plans or analysis in place. 6.4.1.2 Natural Capital Action Plan. c) Describe the resilience of the organization's strategy to nature-related risks and opportunities, taking into consideration different scenarios. 6.4.1.2 Natural Capital Action Plan. d) Disclose the locations of assets and/or activities in the organization's direct operations and, where possible, upstream and downstream value chain(s) that meet the criteria for priority locations. 6.4.1.2 Natural Capital Action Plan. RISK AND IMPACT MANAGEMENT a) (i) Describe the organization's processes for identifying, assessing and prioritizing nature-related dependencies, impacts, risks and opportunities in its direct operations. 6.4.1.3 Management of risks and opportunities. a) (ii) Describe the organization's processes for identifying, assessing and prioritizing nature-related dependencies, impacts, risks and opportunities in its upstream and downstream value chain(s). 6.4.1.3 Management of risks and opportunities. b) Describe the organization's processes for monitoring nature-related dependencies, impacts, risks and opportunities. 6.4.1.3 Management of risks and opportunities. c) Describe how the processes for identifying, assessing and managing nature-related risks are integrated into the organization's overall risk management. 6.4.1.3 Management of risks and opportunities. METRICS AND OBJECTIVES a) Disseminate the metrics used by the organization to assess nature-related risks and material opportunities in line with its risk management strategy and processes. 6.4.1.3 Management of risks and opportunities. 6.4.1.4 Metrics and objectives. b) Disclose the metrics used by the organization to assess and manage dependencies and impacts on nature. 6.4.1.3 Management of risks and opportunities. 6.4.1.4 Metrics and objectives. c) Describe the objectives used by the organization to

manage climate and performance-related risks and opportunities against targets. 6.4.1.4 Metrics and objectives. Integrated Sustainability Report - 2023 296 Appendix IV. Reliability 297 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Integrated Sustainability Report - 2023 298 299 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Integrated Sustainability Report - 2023 300 301 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Integrated Sustainability Report - 2023 302 303 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Integrated Sustainability Report - 2023 304 305 Integrated Sustainability Report - 2023 1 Chairman's letter 2 About us 3 2025 Roadmap 4 Performance in 2023 5 Ambition at the highest level 6 Planet ambition 7 Team ambition 8 Positive impact ambition 9 Appendices Integrated Sustainability Report - 2023 306 Condesa de Venadito, 7 28027 Madrid. Spain sacyr.com

79. [Lendlease CEO on using AI in their businesses](#)

It's no wonder everyone's talking about artificial intelligence: the potential productivity benefits are enough to get anyone excited.

Recent research by Harvard Business School, for instance, found that Boston Consulting Group [consultants who used ChatGPT-4 finished 12.2 per cent more tasks](#) and achieved results that were 40 per cent higher quality, on average, than those who did not use the tool.

It is a massive improvement, especially in an era defined by stagnant productivity. And so, it is unsurprising that companies from all corners of the economy are setting up working groups and taskforces with the aim of deploying artificial intelligence across their businesses.

Current examples range from drafting bid documents and personalising marketing messages, to detecting fraud and making credit decisions. Even the Reserve Bank of Australia is turning to [AI in its fight against inflation](#).

But, as BOSS learns from top business leaders, it is clear that corporate Australia is only at the beginning of its journey with the technology.

Here's how six CEOs are using AI across their businesses today, and, perhaps more importantly, how they plan to use it in the near future.

Tony Lombardo, Lendlease

Property company [Lendlease](#) is using artificial intelligence in two key areas: construction and bidding for contracts.

Chief executive Tony Lombardo says the group is using machine learning to help it improve the quality of bidding for projects. Machines can analyse previous successful and unsuccessful bids to help Lendlease improve the quality of its proposals.

AI can also lead to huge time savings. Lendlease bids on, say, 30 or 40 projects a year, and can use computing power to assemble key, consistent elements of a bid document, which can be 200 pages long.

“The AI actually can write all of that,” Lombardo says.

“We’ve been testing it to see how well it does, and it’s probably doing things at 70 to 80 per cent right.”

Staff are then freed up to “focus on the client and what we are trying to deliver,” Lombardo says.

“It lets us think more strategically on how to actually work on the EQ side of any bid and put more effort on the strategy,” he says.

Lendlease is also using AI to improve safety on construction sites. CCTV cameras patrolling sites feed information into a computer which can identify areas of work, such as pipes, that might be unsafe and need to be checked.

Sue van der Merwe, Lottery Corporation

[Sue van der Merwe](#), chief executive of the \$10.4 billion Lottery Corporation, says the operator of games such as Powerball, TattsLotto and Keno is “early in its journey” of deploying artificial intelligence learning models.

At least in the short term, she predicts the greatest benefits are likely to be in customer marketing and making internal processes more efficient.

On the marketing side, Lottery is starting to use AI to sift through large, disparate sets of data to help it determine when direct marketing messages to customers will be most effective, and on which channels.

Inputs into the machine learning include the day and time of the week, whether the customer tends to purchase lottery tickets online or in store, and the type and size of a jackpot.

If a customer is a regular Saturday lottery player, but occasionally plays Powerball, the AI will enable Lottery Corp to deliver a tailored message about an upcoming jackpot to the customer at a time to maximise the chance of a sale.

“It’s around letting you know what’s happening on any one of the games that week, based on what we know about you, and what would be well received by you, and the most effective marketing communication from our perspective,” van der Merwe says.

“AI is actually not necessarily about offering more products. It’s about offering the right products,” adds van der Merwe, who has been CEO at the group since May last year.

On the revenue front, AI should also make sales forecasting more accurate, while in the back office area, Lottery Corp expects to use AI to make processes such as bank reconciliations more efficient.

Lottery Corp is also using AI to detect changes in a customer’s behaviour that might suggest they are developing a gambling problem, although van der Merwe says the incidence of problem gambling in lottery games is low.

Cynthia Scott, Zip Co

Zip Co uses AI to detect fraud by flagging irregular customer behaviour.

The buy now, pay later company also uses it to determine a customer's creditworthiness and make predictions about their product preferences by drawing on a massive dataset of past transactions.

"So, for example, we might [have] a customer who's a male in his early 30s. [Let's say] he's employed, and he's a homeowner, and he's really sporty," Zip Co group chief executive Cynthia Scott explains.

"We can use the millions of versions of that [type of person that] we've got [in our database], and the years of data that we've got on those [types of] individuals ... to predict how [that new customer is] going to engage with our products and what their risk behaviour is."

The next frontier for the company, as it is for most Australian businesses engaging with AI, is [determining how it can use generative, rather than predictive, artificial intelligence](#), to make its staff more productive and achieve operational excellence.

Scott says one focus area is the real-time generation of scripts for call centre workers.

Customers who choose to speak to a human operator tend to have the most complex questions, so generating scripts for call centre workers would help them navigate the most challenging conversations.

"Right now, there's a lot of people doing work to answer those complex queries, but there's a real opportunity for AI [there]," Scott says.

"Our US team is starting to pilot with a partner to look at AI real-time call scripts."

Scott also sees opportunities in using more advanced "propensity modelling" to deliver effective nudges in the company's mobile app. AI could help the company better predict what a customer was going to do next on its app and serve up more relevant products and services to improve the customer experience.

And then there's software engineering. Scott says Zip's engineers are already using generative AI to help them write code, although all employees are warned not to input any company code or customer data when using ChatGPT.

"We're not blocking [ChatGPT], but you will get a warning just saying, 'Please ensure that you're not inputting any customer data or any IP or any company code ... into the AI engine'," Scott says. "Formalising one of those safeguards and protocols across the organisation is really important."

Mick O'Brien, Equity Trustees

Equity Trustees managing director Mick O'Brien says the financial services company had an AI-powered will-writing product in the market but retracted it when it became clear that it couldn't handle the complexity of many customers' requests.

O'Brien would like to reintroduce a more advanced version of it one day, though. And he also believes there's plenty of scope to ramp up the company's use of AI to analyse everything from wills and trust deeds to court orders and disclosure documents.

"Today, we'd have trust managers and lawyers scanning down and reviewing all this information," O'Brien says. "But a lot of it could actually be reviewed [and] analysed [by AI]."

This analysis could also extend to ensuring the wording used to describe the company's investments didn't fall foul of greenwashing regulations, O'Brien says.

But, given the value of a trustee lies in their judgement and decision-making, O'Brien believes AI will be unable to assume responsibility for many of their tasks.

He offers a hypothetical scenario to make his point. Let's say you have an underperforming investment scheme, he says, and that investors want to redeem their units.

You could use the most recent audited valuation of the scheme to help determine the value of the investors' respective stakes. But that might not represent a fair valuation. And it could be unfair on the remaining investors if you let the outgoing parties redeem their shares at that valuation.

O'Brien believes it is in solving these types of challenges that trustees demonstrate their value to the customer, by exercising judgement beyond the capabilities of artificial intelligence. But he believes that AI could soon get to the point where it flags any abnormalities in a customer's case so that human trustees know which parts of the case to investigate further.

"If we can get to that, then that would make us very efficient," O'Brien says.

"It [would] basically [be] getting through a lot of data and identifying issues and flagging [them], and then allowing us to make decisions and judgements."

O'Brien says it remains to be seen how far AI could go "in the next step of making some of those decisions for us", though. But he tells BOSS that the nature of estate planning and funds management – and the fact that it is a heavily regulated area – suggests that this part of the business will always be left to a human trustee.

Robin Khuda, AirTrunk

Data centre firm AirTrunk is looking at AI to enhance its operations at the design stage, as well as in the construction and ongoing maintenance of its "hyperscale" data centres across the Asia-Pacific and Japan.

Founder and chief executive Robin Khuda says that during the design process, AI can be used to predict key requirements of a new centre, such as water and power usage.

"We are seeing a bunch of tools we're looking to use. You can do a lot of that analysis [of water and power usage] in real time, rather than [do] the design and then get another team of people to do all that analysis separately," Khuda says. Obtaining accurate estimates of power and water usage is critical because up to 90 per cent of data centre outages are the result of human error.

Even before then, AI will be used to help with site selection, because it will be able to analyse data from local utilities and planning departments, and various types of maps to determine quickly suitable locations for the centres.

AI can also be used to make construction more efficient and safer. It can better schedule the different types of work that needs to be done on a site, and ensure that not too many people are working in the same area at the same time, which heightens the risk of accident.

On an ongoing basis, AI will be able to help AirTrunk, which is [considering a stock market listing](#) that is expected to value the company at more than \$10 billion, to predict when equipment needs to be replaced, Khuda says.

Drew O'Malley, Collins Foods

Drew O'Malley, CEO of Collins Foods, expects the KFC franchise operator will use AI to better market to customers.

Fast food customers tend to gravitate to a certain brand for a period of time, and then get tired of it and migrate to a rival. AI can help Collins Foods to understand usage patterns and when a customer is more likely to start favouring a competitor. The company can then send an offer to the customer in an effort to retain them.

“There has been a lot of success around customised offers going to people based on how they like to access the brand. It is getting better and better because the more data we have, the more we learn about what works and what doesn't,” O'Malley says.

[80. UAE National strategy for generative AI](#)

EXECUTIVE SUMMARY The UAE sets a clear vision through its AI Strategy, to become the world leader in AI by 2031. Implementing this vision on the ground requires rigorous dedication and clear steps that outline the path for success. Hence, it is essential to set the foundation, the AI Strategy, with clear strategic objectives that outline the initiatives that are essential in achieving the milestones. It is notably worth mentioning that the AI Strategy aligns with the UAE Centennial 2071, to make the UAE the best country in the world by 2071. The AI Strategy will contribute significantly in education, economy, government development, and community happiness through various AI technologies implementations in different sectors to include energy, tourism, and education, to list few. The UAE AI and Blockchain Council will overlook the implementation of the AI Strategy throughout all emirates but ultimately, the implementation will be a multi-stakeholders effort and cooperation from different local and federal entities in the UAE. There are eight strategic objectives outlined in the AI Strategy, namely: • Build a reputation as an AI destination. • Increase the UAE competitive assets in priority sectors through deployment of AI. • Develop a fertile ecosystem for AI. • Adopt AI across customer services to improve lives and government. • Attract and train talent for future jobs enabled by AI. • Bring world-leading research capability to work with target industries. • Provide the data and supporting infrastructure essential to become a test bed for AI. • Ensure strong governance and effective regulation. The UAE has a strong foundation consisting of cohesive and diversified multinational community that is a fast adapter to new and emerging technologies. Therefore, it acts as a magnet that attracts the best talents from the globe to conduct their experiments on AI solutions in the UAE and open the doors to practical implementations in different sectors.

WHERE THE UAE HAS OPPORTUNITIES TO LEAD The UAE's vision to become a world leader in AI does not mean aiming for leadership across all technologies and sectors. The country will focus on domains where it can have world-leading assets and unique opportunities. Therefore, the mission for this first Ministerial term is to transform the UAE into a world leader in AI by investing in the people and industries that are key to the UAE's success. The UAE will begin

through its existing strengths: 1. Industry Assets & Emerging Sectors 2. Smart Government And also focus on opportunities where it can lead: 3. Data Sharing And Governance 4. New Generation Of Regional Talent By 2031, the very best version of the UAE would package these strengths and opportunities together. For example, early Government adoption of AI will come with training for domestic talent. Governance frameworks will be evaluated by testing them in the UAE's industry pilots. The existence of a strong government and government-owned commercial sector in the UAE provides novel opportunities for trialing governance, education and product innovation in combination.

1. Industry Assets & Emerging Sectors The UAE has set priority sectors – these will be the focus of initial activities. This does not mean that the UAE will stop working on AI solutions in other sectors where AI can deliver other benefits to society. It is also likely that these priorities will change over time, as the UAE economy matures and new opportunities arise. But in the first instance, the UAE will leverage physical and digital assets in two of its strongest existing sectors as part of adopting and trialing AI. Support will also be given to developments in emerging sectors where the UAE has the strong potential economic gains and where there are pockets of opportunity to lead globally. Therefore, the current priority sectors are: Resources & Energy: from existing technology in the extraction industry to renewable energy and innovation in utilities. Logistics & Transport: longstanding air and sea hubs in the UAE make it a valuable location for piloting new systems in the sector. Tourism & Hospitality: opportunity for globally becoming first in customersupport AI, creating integrated and personalized services for tourists in the UAE. Healthcare: a small sector with opportunity to be world leading in specific treatments, particularly in rare diseases. Cybersecurity: a strategic imperative, given the rise of AI, the UAE will also concentrate on building robust systems for protection. Economic Value of AI Further details on these choices are in Objective 2. A core reason for choosing these sectors came down to the potential of AI deployment causing disruption as well as pure economics, for instance the potential of AED 136 billion gain in services and trade sectors played a significant role in choosing Tourism as a priority sector. AI in this growing consumer-facing sector could likely have spillovers into other service sectors. AED 91 billion in resources and utilities contributed to making energy a priority, as did the AED 19 billion in logistics. Estimates for global economic gains from automation technologies - 0.3% to 2.2 % growth in compound annual productivity – are impressive

2. Using this kind of modeling of year on year productivity gains, PwC estimated that AI will contribute AED 353 billion to GDP by 2030 (13.6% of GDP). Gains from increased performance outweigh those that come from replacing labor with machines in some sectors, which play a major role in the young and resource-rich economies of the Middle East. For example, 85% of gains in oil and gas are likely to be in performance rather than labor substitution. This is similar in the redesign of the automotive industry or the large changes we are seeing to consumer marketing techniques. Spending on AI is also a significant economic factor. International Data Corporation estimates annual spending on AI in the Middle East and Africa to reach AED 419.54 million by 2021, increasing 32% a year. Using the UAE's national statistics, the absolute opportunity to increase economic output based on current technology capabilities rather than focusing on annual productivity growth was calculated

3. Assuming automation happens to the full extent it can in each industry, there is a potential gain of AED 335 billion in increased economic output for the UAE. This is the equivalent to 26% increase.

2. Smart Government The UAE public sector is already a leader in smart public service delivery: The UAE is already taking steps to apply AI in innovative ways across government – dynamically adjusting transport timetables to respond to incidents, using AI sensors for smart traffic, deploying facial recognition to monitor driver fatigue and introducing chatbots to improve customer service. Objective 4 explains how the UAE will

take steps to increase the amount of government experimentation with AI to improve the lives of its citizens. 3. Data Sharing and Governance It is part of the UAE's ethos to turn ambitious visions into deliverable projects. This connection between big ideas and practical implementation will, become an asset in AI policy discussions, that can fall easily into abstract or implausible science fiction. Combining hands-on experience with new technologies and global policy development is a strong way to develop a plausible, positive future for AI. How will the UAE ensure AI is used for good? Public debates about AI often focus on whether or not it could take over important human decisions: from whether we go to war, to who receives medication. There continues to be a range of views about the prospects of AI, and many potential future scenarios for AI in the UAE societies. There is still time to change what this future will look like, making it one that more clearly reflects the UAE's values. The actions we take today are still very much under human control and can still reflect those values. Responding to this opportunity, several of the initiatives in this strategy aim to develop a values-driven approach to AI: The UAE Government will play a direct role in designing and enabling AI systems that create the most value for society (objective 4). This will also give the UAE practical experience of how these systems operate and allow the country to identify, ahead of time, any potential unintentional consequences. These schemes and the national pilots in objective 2 will guide the approach to the governance of AI (objective 8). This approach to governance - embedded in worked examples - will help take the UAE beyond abstract statements to useable guidelines for values-driven AI. The schemes will advocate these guidelines on a global stage, working with other countries and international technological groups (also objective 8). Finally, research that keeps to these ethical principles will be rewarded (objective 6).

4. New Generation of Regional Talent A young and growing regional population is often described only in terms of unemployment. Youth unemployment in the Arab countries and Middle East was 30.6 % in 2016. It remains the highest of any region globally. But the Middle East and North Africa has an unusual segment of the professional workforce. There is a high proportion of professionals already involved in operations, IT and engineering. In fact there are giants in the field of AI who have come from some of the most fragile states in the Middle East. Iyad Rahwan and Oussama Khatib were both born in Aleppo, Syria. Iyad is now the director and principal investigator of the Scalable Cooperation group at MIT Media Lab. Oussama is a professor of computer science at Stanford University. The UAE offers access to world-leading universities and a safe hub for highly skilled professionals to re-skill the most in-demand AI roles. The country needs to leverage on its geographic position, and this existing cohort of talent around it. Out of the job functions reported on LinkedIn profiles, operations, information technology and engineering are ranked 1, 4 and 6 respectively 3. There is some evidence that there is a significant subset of these individuals already starting to combine technical skills and business operations. Data from jobseekers on the Middle East and South Asia jobs website, Bayt. com, shows that business analysts with technical skills often already have sophisticated, AI-relevant skills. 21% of the skills identified among this group were associated with business intelligence software like IBM Cognos, Microsoft Power BI or Qlik Sense. 20% were to do with data operations experience, for example with Hadoop or Apache Pig. 8% were Machine Learning & Statistical Modeling tools like Neural Networks 5. The UAE is also globally competitive when it comes to the proportion of university graduates who study STEM subjects (22% compared to 16% in the US). These graduates already have the base foundational skills relevant to AI (computer science, programming literacy, and statistical analysis) and so can be rapidly upskilled to become AI-ready.

EIGHT STRATEGIC OBJECTIVES Although priorities are set out above, there will need to be a complete system of support to move from a nation that adopts AI to one that is building and exporting it.

The UAE's first steps will build a strong brand through AI activities that demonstrate the UAE as a testbed for AI technology. This will come through brokering agreements with international firms to base pilots in the UAE (under objective 2); it means coordinating access to domestic data systems applications (objective 3); and it will require government to take the lead in providing AI-enhanced services (objective 4). There are also some early steps to be made in starting to build stronger foundations in talent, research, data and governance. Publicly accessible AI courses have already begun with large tech partners (objective 5); and international discussions on the positive use of AI provide an active platform for better governance of these technologies (objective 8). Over time, AI activities will include more significant programs – from funding for proof-of-concepts to a domestic AI Accelerator. The foundation will also start to grow a new generation of AI-ready talent, complemented by regular presence from leading global AI researchers in the UAE and through playing a leading role in international governance initiatives. Colleagues in the UAE Government, international bodies, educational institutions and global AI firms will play a significant role in achieving some of these objectives. The Office of the Minister of State for Artificial Intelligence (henceforth 'AI Office') will help broker new partnerships, particularly in education and governance. In particular, the AI Office aims to support other Ministries to make the most of world-leading AI technologies in their projects and policies, as well as train a generation of AI-ready talent in the UAE. The second half of this report provides more detail of the direction under each objective. This includes detail of initiatives that are already running, ones that to start over the next 3 years, as well as examples of successful policies and projects from other nations that could provide templates for UAE policymakers.

OBJECTIVE 1: BUILD A REPUTATION AS AN AI DESTINATION To become a global AI leader, the UAE needs to compete with destinations around the world that are also trying to attract scarce AI talent and grow AI investment. Boston, London, Beijing, Shenzhen, Toronto and many other places are all vying to be the 'next Silicon Valley' for AI. Achieving this objective will require a brand that is built on what differentiates the UAE: its established reputation as a bold innovator. This reputation already brings companies to the country. SparkCognition, the world-leading AI firm, recently announced their first international office outside the US to be based in Dubai. This objective relies heavily on achieving the other seven. Those objectives are necessary but not sufficient to deliver the UAE as a destination for AI talent and investment. There will also need to be a brand campaign that explains and illustrates the UAE AI offering in a compelling and authentic form. This brand will provide a practical means to communicate this to the rest of the world. This has been announced as 'UAI'. UAI Brand The UAE is developing a UAI brand and will use this to attract talent and business from across the globe to come to the UAE to test and develop AI. This includes a UAI mark recognizing high quality, ethical AI companies. It would reward safe, efficient, verified AI technology with a 'UAI Seal of Approval'. The UAI will consist of four levels of approval to include Public Sector Level, Private Sector Level, Institutional Level, and Product Level. The certification system is based on the highest level of world-wide standards that will establish the core requirements in obtaining the UAE Seal of Approval. This robust, rigorous, and comprehensive certification methodology will ensure verifying the entities with the best AI technology in the region. The UAE is aiming to host key international conferences and forums on AI making it a hub for global experts and entrepreneurs. With this, the UAE will become the center of AI startups in the region. Singapore developed a successful brand campaign called 'Smart Nation'. It demonstrated the connection between digital innovation and national priorities, signaling that the digital revolution is at the center of Singapore's national strategy. A brand identity was backed up by regular 5, substantive indicators of progress in the field. **OBJECTIVE**

2: INCREASE THE UAE COMPETITIVE ASSETS IN PRIORITY SECTORS THROUGH DEPLOYMENT OF AI AI has the potential to generate up to AED 335 billion in the UAE economy boosting this by supporting industry pilots in sectors where this kind of intervention will create the most economic or social value. This objective details our initial priority sectors. This effort is complemented by support for government services in objective 4. In the medium to long term, these priority sectors could change. Existing Assets The largest economic gains from AI will come in significant and mature sectors, where the AI potential is also high – finance, resources, construction and retail trade. Government has a role to play in supporting industry to achieve these gains – helping industries to develop AI where a competitive advantage exists, incentivizing global AI firms to locate in the UAE and local firms to connect globally, and finally by supporting business more generally with advice to become successful in an AI enabled world. In three sectors, there are additional national assets or need for innovation that make them priorities: a. Resources & Energy: The UAE is the 5th largest exporter of oil in the world. The existing extraction industry already uses modelling software and algorithms to support its operations. As the UAE makes the transition to renewable energy supplies and more efficient water desalination, there is also an opportunity for AI systems to play a fundamental role in energy sector innovation. There is an opportunity to open up this sector to more companies, and provide support for proof-of-concept systems developed first in the UAE. The UAE is planning a proof-of-concept to utilize AI systems in order to focus both internally, to make energy saving decisions, and globally to understand supply and demand for oil. Energy supply and utilities is also an area of innovation. From smart grids to water recycling, there also needs to be support for small companies and utilities supplies to test and improve this infrastructure. b. Logistics & Transport: The UAE is a globally competitive transit hub. 60 million people pass through Dubai Airport each year; 26 million pass through Abu Dhabi Airport. Jebel Ali port is the largest marine terminal in the Middle East and provides market access to over 2 billion people. Airport and port management companies from the UAE continue to expand their management of overseas facilities. The UAE’s peninsular location between South Asia and East Africa provides an enduring advantage. There is an opportunity to make the most of these assets – facilitating test beds for new technologies in these locations by deploying AI solutions for air traffic management, baggage handling, and airplane boarding.. Demonstrator projects that make the most of these physical and digital assets in logistics and transport will be funded. c. Tourism & Hospitality: Tourism is a highly visible, successful export sector for the UAE. There is a particular opportunity to integrate services attracting tourists to the UAE and the packages that are offered once they are here, including business travelers and those on short stopovers. The greatest opportunity in Tourism & Hospitality comes from innovations that have potential for spillover into other customer service sectors. AI can be utilized to predict tourist’s needs and provide customized services. Emerging Sectors There are three other sectors, where the UAE has different kinds of advantage – these are not about existing scale but pockets of opportunity that are already visible. There have smaller, but valuable data assets; fast-growth and entrepreneurial activities or areas where government are taking a lead in the sector. The opportunity in this sector is to create partnerships that can boost tourist numbers in the UAE, where those tourists have AI-driven schedules or use automated assistants during their stay. a. Healthcare: Government does not own the healthcare industry in the UAE, but it plays a significant role in it. Dubai Health Authority’s new Dubai Genomics program hopes to bring population-scale whole-genome sequencing to the Emirate. The aim is to use the diverse genetic community in the UAE as a resource for new scientific studies, which make it easier to predict risks associated with genetic-related illnesses. This kind of study, and similar uses of patient data from UAE hospitals,

could lead to novel opportunities for digital health innovation based in the UAE. The opportunities will most likely be low in number but some could be world-leading or have significant impact on the care of individuals with rare diseases. For example, testing diagnostics in a clinic that has access to the latest monitoring technology, detailed historical patient data and a diverse population could provide a rare asset for healthcare companies. There is also an opportunity to focus on diseases that are prevalent in the region, which receive relatively little attention from global pharmaceutical companies. The AI Office is most interested in providing access for companies and researchers to hospital and national databases, where their work could develop specialist capability in diagnostics that use AI, particularly for common diseases in the region. The AI Office has funded research into developing an AI algorithm for detecting Tuberculosis in patients via diagnosis of X-ray data and the pilot was launched at the United Nations World Data Forum 2018.

b. Cybersecurity: Historically, the UAE has attracted the regional hubs for large technology companies like SAP or Microsoft, which often locate to free zones within the city. More recently, the UAE has grown or attracted smaller cybersecurity firms. There is significant potential benefit for government in developing better cybersecurity for their own services and for making the UAE a secure environment for business. There is also a strong entrepreneurial segment in cybersecurity, which the government wants to encourage. There will be more than 7.5 billion Internet users by 2030 (90% of the projected world population of 8.5 billion). Like street crime, which historically grew in relation to population growth, similar evolution of cyber crime is being witnessed with projected damage costs to hit USD 6 trillion annually by 2021. Hence, cyber security is a big investment that requires a priority considering the global shift towards maintaining safety. Over the next five years, the global spending on cyber security will cumulatively exceed USD 1 trillion⁷. Supporting pilots that demonstrate new cybersecurity approaches in the UAE first. There is also interest in community-building and skills-building programs for SMEs and local talent that focus specifically on AI as a risk or opportunity for cybersecurity. Proof-of-Concept Support in Priority Sectors Within these five priority sectors, the UAE government will fund or broker pilot projects. These proofs-of-concepts could be designed by public sector, private sector or consortia. Funding will depend on how well proposed pilots map onto the reasoning for each priority sector as detailed above. For example, the AI Office is working with various private sector companies to develop pilots that use quantum computing to support health diagnostics and global energy supply management. Developing AI technology in the UAE will help the UAE diversify its economy, enhance productivity and find new sources of growth. It will also firmly establish UAE's credentials as a world leader in AI and act as a catalyst to attract further talent and investment. Focusing efforts in industries with an obvious potential for AI development, commercialization and export exists will maximize the likelihood of success and the return on investment.

OBJECTIVE 3: DEVELOP A FERTILE ECOSYSTEM FOR AI A combination of funding, knowledge, and strategic support will be needed to develop a domestic AI ecosystem. This starts with better access to local data infrastructure and funding for projects that make the most of this which will lead to opportunities for building new companies. Once these elements are in place, there needs to be incentives for world-leading products and services to be developed in the UAE. There are difficulties and uncertainties in developing algorithmic services. AI systems often require coordination across several locations, firms or industries. They also require trusted partners in order to automate products and services. Governments can play an important coordinating role, providing access to networks, data and finance that can help overcome these barriers. AI Network In order to encourage more research, collaboration and commercialization local expertise will be aggregated through the establishment of a network of researchers, industry experts and policy

experts from across the UAE. Funding for AI research and companies could be provided according to priorities identified by the group, backed by evidence from a survey of regional AI activities. The Mohammed bin Rashid Innovation Fund has AED 2 billion to support local innovators. Collaboration between the fund and the UAE Artificial Intelligence and Blockchain Council (see objective 4) could support companies that need access to government data or partnerships with Government. The AI market is estimated to grow to USD 60 billion by 2021, with China alone aiming to create a USD 150 billion market by 2030⁸. The UAE will need to accelerate domestic AI commercialization in order to capture its share of this growing market. There are currently an estimated 2,600 AI-focused startups globally, but the vast majority of them are in America and China, along with economies like the UK and Japan⁹. The UAE has an opportunity to become a competitive regional hub for AI entrepreneurs through providing a supportive ecosystem. A developed ecosystem of local startups will ensure that AI solutions are catering to the market needs of the UAE economy, rather than being reliant on adapting imported ideas and products. Applied AI Accelerator The AI Office will support the development of a domestic AI startup and product development ecosystem through incubator funds, mentoring, and publication of shared knowledge. Zeroth.AI, a Hong Kong based AI accelerator, provides USD 120,000 in seed capital to companies in the program for exchange for 10% equity stake. They also provide mentoring and support to get a long-term visa in Hong Kong. Another example, this time of a government supporting industry development, is in AI Singapore's 100 Experiments project. The project funds researchers and academics with up to USD 250,000 to work on industry specific problems for which AI technologies may be quickly built, but without the need for time and resource-consuming research. AI Incentive Scheme for Overseas Companies Greater FDI by foreign firms will be a key enabler of industry development, bringing technology and skills to the UAE. The scope for greater FDI is real. 70% of global executives believe technological change will lead to an increase in global FDI¹⁰. While the UAE is seen as a promising source of FDI, it is not seen as a top destination for FDI investment. Planned relaxation of foreign investment laws and improving reputation for ease of doing business should facilitate greater FDI¹¹. Incentives will be developed to encourage UAE firms to partner with global AI technology firms to foster greater links into global value chains and enable technology transfer from international firms. The incentives will also motivate international companies to set up regional offices in the UAE or relocate here. For example, a new cyber research center in Stuttgart and Tübingen, Germany (the Max Planck Society's Institute for Intelligence Systems) attracted foreign investment from Amazon leading to an estimated 100 jobs over the next five years and providing EUR 420,000 per year to fund research students. Foreign investors were driven by locating near this known center of talent, which previously had not engaged with industry partners. Although the UAE does not have this kind of strong AI talent hub, it is building attractors that will grow the technical community here quickly Business Support for UAE AI Firms Once local systems and companies are in place, the next step is to form more ambitious UAE presence in global markets. Creating global markets often requires investments that are speculative (e.g. international trips, marketing campaigns) or require coordination (e.g. trade missions, joint ventures). This can often be difficult for individual businesses to undertake. Similarly, investments in new products require largescale investments, which can carry too much risk for any one investor. Governments can help business solve this problem by offering guidance, financial support, and by acting as a coordinator. Providing support and guidance will overcome knowledge barriers to developing AI solutions and strengthen connections into international markets, increasing exports and growth. **OBJECTIVE 4: ADOPT AI ACROSS CUSTOMER SERVICES TO IMPROVE LIVES AND GOVERNMENT** Government can play a strong role in

making sure AI delivers the greatest public value, by making citizens safer, healthier and happier. The UAE also faces significant social and economic challenges, where the outcomes for the population are poor compared to other countries. For example, high rates of obesity and heart disease, high rates of traffic fatalities, poor air quality and poor education outcomes. Using AI to better respond to these challenges has huge potential benefits. There is a role for Government in supercharging this – providing the focus, resources and drive to solve these challenges. National AI Challenges A single program could be set up to support the best ideas from across government, universities and the private sector, which solve the UAE’s most pressing challenges using AI. In Australia, the government recently launched a National Missions Program, beginning with making the nation the healthiest in the world. This included a step-change increase in investment in national genomics and personalized medicine capability and its integration into medical research and healthcare systems. In similar fashion, a nationwide program to tackle the UAE’s distinctive challenges will be launched. The best ideas will receive funding, mentoring and access to data. Importantly, the program will have the potential to demonstrate the benefit of AI to the UAE population and inspire the nation to embrace AI to make lives better. UAE Artificial Intelligence and Blockchain Council AI can also be used to improve the experience and cost of government transactions and services. There will be fewer time-consuming administrative processes, fewer errors, and more convenient services. Building on a successful generation of digital government initiatives, the UAE has an opportunity for global leadership. But government entities need support from political leaders to move key services – such as tax filings, applications, regulatory compliance checks, payment of fines – to interoperable digital platforms, with high-quality, complete and accessible data. The UAE Artificial Intelligence and Blockchain Council includes representatives from all emirates on both federal and local levels. The Council’s main objective is to identify how and where AI can be incorporated in government and what supporting infrastructure it requires. **OBJECTIVE 5: ATTRACT AND TRAIN TALENT FOR FUTURE JOBS ENABLED BY AI** A recent study commissioned for the 2018 World Government Summit in Dubai argued that for six Middle East countries, 45% of the existing work activities in the labor market are automatable today based on current technologies. This average is slightly below the global average of 50%¹². The same study shows that this risk is higher in sectors when employees perform routine tasks like in manufacturing and transportation. In the arts, education and healthcare, where human interaction or creativity is more important, the risk is much lower. For the UAE, around 43% of existing work activities have the potential to be automated across key sectors such as administration, government, manufacturing and construction. With around 70% of Emiratis employed in the public sector, retraining of government workers is particularly critical. It has been estimated that almost 300,000 jobs in the UAE in the Administrative and Support and Government sector may be impacted by automation, with around 125,000 of these jobs held by UAE nationals¹³. This will have a major impact on the public sector workforce and needs to be carefully managed, with a 2016 survey of Emirati workers finding the ideal future role for 54% was one in administration i.e. a role that may not exist in the future. These predictions could prove inaccurate. Working practices in the UAE are often different to US job descriptions, which are the ones used to estimate how work can be automated. At the same time, the growing youth population in the region and dominance of job-related visas in the UAE could have the greatest effects on the underlying dynamics of the workforce. Given this, there is a significant lowskilled population whose job can easily be changed by automation, but who currently have few skills to make the most of these changes. 40% of the UAE workforce has good digital skills¹⁴. This is less than the 56% of people with good digital skills in the UK, the top rated-nation in the AI-Readiness Index¹⁵.

For most of the population, developing better digital skills and basic understanding of AI will help them make better decisions in an economy where automation technologies enter the workplace. Public AI Training Free courses are being run for UAE residents to raise awareness and understanding of AI technologies. The UAE AI Summer Camp took place in the summer of 2018 and it supports the efforts of future knowledge transfer and building a generation capable of adopting advanced technologies in developing solutions for various future challenges. Over 5000 UAE residents received specialized training on the fundamentals of AI with hands-on experience .

Upskilling Students There is a similar opportunity in the student population. The UAE has a small student population, but a high percentage (22%) are in core STEM areas: ICT , engineering and natural sciences. Upskilling STEM graduates with specialist courses will provide the fastest short-term solution to increasing the number of AI experts. This upskilling will also provide a stronger pipeline of students able to undertake post-graduate training in AI to develop the pool of UAE talent able to build AI systems. The United Kingdom has recently stated an aggressive target of having at least 1,000 government supported PhD places at any one time in AI and related disciplines, by 2025. In order to compete technically on a global scale the UAE must also be ambitious in its targets, to that effect, at the February 2018 World Government Summit, the Minister of State for Artificial Intelligence announced that the UAE has the intention to produce world-class AI talent. This will be done through upskilling 1/3 of the UAE’s STEM graduates per year (2000 students). Given the public sector is a major employer and potential user of AI in the UAE, The AI Office has also started specific training for government employees.

Government Training The AI Office is offering more advanced courses for Government employees starting Q4 2018, focused on skills needed to work with them being the AI Experts (ambassadors) in their entities. These require participants to complete a capstone project related to their current job. The aim is to ensure that 100% of senior leadership in government - Director-General, Ministerial and Senior-Ministerial levels - are trained and versed in AI, with more junior government employees being trained on a more ad hoc basis. This illustration summarizes how skills training could fit together across different segments of the labor market.

Professional Upskilling There is also an opportunity to take professionals with expert digital and analytic skills and provide them with the training needed to become specialists in AI. In the New Generation of Regional Talent section of this AI Strategy, the strong segment of professionals in the region with operational and analytical skills was highlighted. It is the AI Office’s aim to help upskill these individuals. Upskilling existing professional workers in the UAE could include specialist training, secondments and study tours overseas.

Employment Transition Support Skills training for 60% of the workforce with low digital skills would benefit from more robust data on current skills in the labor force and current job openings. The AI Office supports the Minister of State for Higher Education and Advanced Skills in their efforts to improve this data collection, and champions efforts to develop a series of career advice tools and services to help current and future workers make more informed choices.

OBJECTIVE 6: BRING WORLD-LEADING RESEARCH CAPABILITY TO WORK WITH TARGET INDUSTRIES This objective is concerned with building the wider knowledge production in the UAE, including university and commercial R&D. This will need to include increasing investment in research and encouraging world-class academics to work in the UAE. Investing in AI R&D capability is a necessary first step. The US, France, UK and China have embraced strategic national plans to boost AI’s share of its R&D investments. The UAE is ranked 35th in the world for overall R&D investments. There are researchers in UAE institutions developing or modifying algorithmic or automated technologies. To provide a targeted boost to R&D in AI, the focus will be on supporting and expanding the research of this small community.

The UK's national institute for data science and artificial intelligence was created as a partnership between centers of excellence at existing universities. Five founding universities – Cambridge, Edinburgh, Oxford, UCL and Warwick – and the UK Engineering and Physical Sciences Research Council created The Alan Turing Institute in 2017. It provides coordination and support for the research community, without the overheads of establishing a new university-scale institution. The AI Network in Objective 3 will help support similar coordination. Even in countries with a well-established research base, AI experts are in short supply and highly attractive to industry. For example, 65% of Google DeepMind research hires came from academia¹⁶. AI ideas are still emerging and new technologies are still finding their way to industry. Governments are investing heavily in AI, to supplement but by no means match significant investment by private companies. The US and China are world-leaders in developing domestic research capacity. This dominance is visible in AI research output, where the countries also produce the most number of original research papers on AI¹⁷. Countries with fewer researchers are still able to have research impact by building capacity in strategic areas. Countries like Canada and Spain have already developed hubs in AI-related research. The UAE is a young country that has not yet established a strong academic tradition to provide a pipeline of world class researchers. It will need to look for other ways to access research talent. With more than half the world's population just a five hour flight away, the UAE is in a prime position to attract global research talent to visit the UAE to help build capacity and share their AI knowledge. Short-term opportunities for leading AI professors to work and experience the potential in the UAE may also support the UAE to attract leading professors in the medium to longer term, and develop UAE university capacity. Saudi Arabia's Center for Complex Engineering Systems is a partnership between the Saudi Government and MIT, creating a flow of expert academics to Saudi Arabia. National Virtual AI Institute To ensure this increase in investment is well targeted, the AI Office will survey current local R&D capacity. This will help identify options for what is required and how best to boost R&D that can be directly applied to industry, providing a medium-longer term solution to addressing the UAE's R&D gap. Following the survey, the UAE will launch a National Virtual AI Institute with stakeholder partners to aggregate the best local and global expertise in the region, and to encourage more R&D activity, collaboration and commercialisation. The AI Network in Objective 3 will provide the platform for this R&D network. Key Thinkers Program A program to attract key AI thinkers to visit the UAE will be initiated. These key AI thinkers will participate in workshops and lectures with local universities and businesses. Key Thinkers will also be provided with incentives to run research projects in partnership with these local bodies. In line with objective 4, improving lives, and objective 8, good governance of AI, The AI Office will also want to recognize and reward AI research with the greatest value to society. An award for programs with outstanding governance frameworks or the greatest social impact would be a helpful incentive. AI Library The research gap can be closed if the benefit of research can be shared with those who have an interest in AI. In order to boost further innovation, the AI Office will work on creating an open-access digital library of research and papers in both English and Arabic. This will be a first-of-a-kind initiative to boost the research sector in the region. The UAE will also endeavor to create accessible summaries of UAE government funded AI research and programs in order to help encourage the development of AI solutions. The AI Library will be a joint collaboration between academia, industry and government. OBJECTIVE 7: PROVIDE THE DATA AND SUPPORTING INFRASTRUCTURE ESSENTIAL TO BECOME A TEST BED FOR AI Governments around the world are increasingly recognizing the value of the vast data sets they collate. Machine learning models need access to training data sets, and open data can also be used to test and improve AI systems'

performance. The UAE has taken steps towards opening data to improve transparency, but still significantly lags behind other countries in the number of open data sets it releases. 537 datasets are currently available, whereas Turkey has shared 1,280 and Canada has over 10,000. Data Sharing The UAE has an opportunity to become a leader in available open data for training and developing AI systems. The greatest advantage that the UAE has is in its diversified culture, with more than 200 nationalities residing in the UAE. Given the unique mixture of cultures in the UAE, the data sets that the country holds is impeccable. This data in combination with machine learning can aid in accurately diagnosing diseases such as Tuberculosis (TB) using Artificial Intelligence. The UAE realizes that the oil of the future is data and will invest into creating a robust data infrastructure. The UAE's ambition is to create a data-sharing program, providing shared open and standardized AI-ready data, collected through a consistent data standard. The X-Road platform in Estonia supports access and combination of government and private databases, setting the stage for the application of machine learning tools. The data solution saves citizens over 800 years of working time per annum. Secure Data Infrastructure A secure data infrastructure will be necessary to facilitate data sharing, and manage privacy concerns. Investing in a single AI data infrastructure makes it easier to do this efficiently, and makes it simpler to access data relevant to research or developing new products and services. Some countries have already experimented with virtual data libraries. Australia's SURE (Secure User Research Environment) allows researchers to access data in hospitals, general practice and cancer registries. While designed to handle health data, it is now being used by other agencies with sensitive data, e.g. the Australian Taxation Office and the Australian Department of Social Services. SURE offers a data repository service, where a user can purchase secure, hosted space for multiple datasets and projects and set their own data governance framework, if approved by SURE. SURE also offers single project workspaces where SURE manages both the data governance and technical aspects of hosting. In these cases, a user must seek research ethics committee approval for the research before a workspace will be granted. Beyond national datasets, there is also a need for data protection and authentication as part of good corporate practice in the UAE. As the consultative group under objective 8 develops, they will begin to address these issues. Europe's General Data Protection Regulation includes new rights for consumers; it provides an opportunity to re-consider how consumer data is handled, even for customers who are not European citizens. **OBJECTIVE 8: ENSURE STRONG GOVERNANCE AND EFFECTIVE REGULATION** The speed of developments in AI is a challenge for governance. With vast research efforts around the globe, it is difficult to ensure this technology is developed in a safe and ethical environment. As Governments and leading AI thinkers around the world grapple with this challenge, there is an opportunity for the UAE to learn from the best and collaborate with others to ensure effective governance and regulation of AI, both domestically and internationally. The UAE has the ambition to take a leading role in the development of responsible AI and advancing the regulation of AI. For example, the UAE has an important contribution to make to this global discussion by connecting abstract discussions to pilots run by, or in partnership with government. This will also mean working to make sure the UAE has the legal environment to support innovation in general and the adoption of AI in particular. Innovations in AI technology often require rapid changes in regulatory settings and can create risks to society. The adoption of interconnected data systems and the growing dependence of major industries on software also makes an economy more vulnerable to digital disruption. Cyberwarfare capability will continue to grow, meaning that cybersecurity will become increasingly important. In the absence of a coherent national strategy, cybersecurity would be developed on an ad hoc basis. This is inefficient and risks leaving gaps. This will be addressed through the governance review. National Governance

Review The UAE Artificial Intelligence and Blockchain Council will add to its remit to review national approaches to issues such as data management, ethics and cybersecurity. They will also review the latest international best practices in legislation and global risks from AI. Furthermore, the Council will ultimately oversee the implementation of the AI Strategy in the UAE. Other countries have developed advisory structures that combine expertise in technical fields and regulation. The 2016 White House Artificial Intelligence Strategy formed a standing committee consisted of regulators and industry experts. California's Little Hoover Commission is currently studying the impact of AI on regulatory settings through a committee of experts. France has created a national AI ethics committee, as well as ethics-by-design training for tech developers to build ethical considerations into their projects. Globally, the UAE has begun work on a number of initiatives to help develop responsible AI. During the World Government Summit in February 2018, over 100 leading experts at the inaugural Global Governance of Artificial Intelligence Roundtable were hosted. This collection of AI experts debated how governments could best navigate the challenges posed by the rapid rise of AI. Second Global Governance of Artificial Intelligence Roundtable For the 2019 World Government Summit, The AI Office is working with UNESCO, OECD, IEEE and the Council on Extended Intelligence in identifying the foremost experts and themes to explore. All of these working groups will then present their outcomes at a High Level Ministerial Panel composed of the world's foremost Minister's of Digital, Technology and ICT who are responsible for the development and use of AI in their countries. Intergovernmental Panel on Artificial Intelligence A natural evolution of the Roundtable is in the formulation of an intergovernmental body, dedicated to providing a mechanism for governments and private companies to better understand AI and its impact on societies in order to help give a solid framework for future regulation, in a more tangible and enforceable manner. In March 2018, President Macron, at the launch of the French Artificial Intelligence Strategy, announced a desire to establish an "IPCC for Artificial Intelligence" – referring to the Intergovernmental Panel on Climate Change. The UAE has expressed a desire to work with France and other governments in creating the foundations for such a body. The AI Office is actively working toward making this happen. CONCLUSION The UAE is unlike any other country in its diversified population, comprising of unique talents – we aim to give this human potential the best opportunities to nourish and flourish. Given this human potential, the UAE has always aimed at not just being better, but to become the best. The AI National Strategy is a cornerstone of the UAE Centennial 2071 and is a major variable in the overall equation. It will bring transformation to a new level by 2031 and set the foundations for future generations in the UAE to become the best. As one of the first movers in paving the path for AI nationally, a plethora of challenges is certain to arise, but we are true believers in that nothing is impossible in the UAE. We are a country that is known for tackling challenges head on, creating new opportunities, and deploying innovative solutions. As Minister of State for Artificial Intelligence, I aim to catalyze the responsible development of AI within our country, in order to help us reach the UAE Centennial 2071 – and to act as an inspiration for other nations to harness this technology for the betterment of humankind.

[81. About half of McKinsey staff allowed to use generative AI: report](#)

Employees of global consulting firm McKinsey and Company have been given permission to use generative artificial intelligence (AI), including ChatGPT, in the workplace, according to a report.

"About half of [our employees] are using those services with McKinsey's permission," said Ben Ellencweig, senior partner and global leader of McKinsey's AI consulting arm QuantumBlack, according to Venture Beat.

The organization has more than 30,000 employees across 67 countries. Ellencweig, however, clarified that the firm has rolled out guidelines and principles of generative AI use, which includes a prohibition on uploading confidential information.

Embracing AI in workplaces

The revelation adds McKinsey to the list of employers around the world [embracing generative AI](#) and the assistance they offer to workplaces. Recently, Japan-based firm Daiwa Securities Group also allowed around 9,000 employees to [use ChatGPT in workplaces](#) to ease the burden imposed by routine tasks.

The reports come amid growing acceptance of generative AI among employees across the world. In fact, findings from automatica revealed that employees in the [United States \(63%\), Japan \(76%\), and China \(87%\)](#) want ChatGPT to help them in workplace decision-making.

In McKinsey's case, they did not disclose what they use generative AI for, but they noted that their tech staff "have them all in a sandbox, [and are] playing with them every day," [reported Venture Beat](#).

Using AI safely

Alex Singla, another senior partner and global leader at QuantumBlack, unveiled a five-step approach on how to integrate generative AI in workplaces safely. As reported by Venture Beat, these suggestions include:

IT stack and infrastructure: Think about IT stack and infrastructure and where the AI tools and data will be located

Data: Determine whether to use structured or unstructured data, how to organise them, and what protections they require

Choose the right AI model

UI and UX: Consider the user interface and user experience of the AI to be used

Change management: Ensure those using AI will be supported, including how their work duties will be changed

The recommendations come as employers around the world get warnings on how generative AI [can impact workplaces](#). For some employers, including [Samsung, Amazon, Verizon, among others](#), they have implemented restrictions on using AI to stamp out potential privacy risks.

82. [Deloitte Launches Innovative 'DARTbot' Internal Chatbot](#)

Deloitte today announced its development and deployment of "DARTbot," an internal chatbot powered by cutting-edge Generative Artificial Intelligence. DARTbot is capable of generating

intelligent responses and providing valuable insights to support nearly 18,000 of Deloitte's U.S. Audit & Assurance professionals in their daily tasks and decision-making processes.

Deloitte is infusing Generative AI applications and capabilities across its organization to help its professionals become more efficient and productive. These applications and productivity tools are focused on proprietary functional and industry content that is applied with Deloitte's Trustworthy AI™ framework, managing AI risks such as hallucinations, and improving user confidence and trust.

As part of this ongoing commitment, Deloitte is rolling out purpose specific Large Language Models (LLMs) and chatbots to support specialized teams across its business, including DARTbot to support Audit & Assurance professionals.

“Integrating Generative AI into our technology solutions, combined with the experience, critical thinking and professional judgment of our professionals, will allow us to deliver deeper insights and a differentiated client experience with distinction and trust,” said Dipti Gulati, U.S. CEO, Audit & Assurance, Deloitte & Touche LLP.

Designed with user experience in mind, DARTbot's user-friendly interface allows Deloitte's Audit & Assurance professionals to seamlessly interact with the chatbot. The system is meticulously integrated with vast datasets of relevant industry knowledge and leading practices, exhibiting the accuracy and reliability of its responses, and facilitating further analysis by providing references to source materials.

With the deployment of DARTbot, Deloitte aims to transform the way its professionals work, enhancing their productivity and enabling them to focus more on applying professional objectivity, skepticism, and evaluating bias. The chatbot acts as a virtual assistant, providing real-time guidance, answering queries, and assisting professionals in navigating complex accounting questions.

"We are excited to introduce DARTbot as an invaluable resource for our Audit & Assurance professionals. This internal chatbot represents Deloitte's ongoing commitment to leveraging cutting-edge technology to empower our teams and deliver exceptional client service. DARTbot will help our professionals quickly research complex accounting questions and elevate the overall audit and assurance experience," said Chris Griffin, managing partner, U.S. Audit & Assurance transformation and technology, Deloitte & Touche LLP.

One of the key priorities throughout the development process was ensuring data security and confidentiality. Deloitte has implemented robust security measures, leveraging state-of-the-art encryption protocols and access controls. The chatbot operates within a dedicated, secure, self-contained environment that does not use any user input data to train the model.

“DARTbot represents a significant milestone in Deloitte's ongoing commitment to harnessing the power of emerging technologies. Through continued internal innovation, we're able to assess and deploy new technologies to benefit our professionals and provide deeper insights to our clients,” said Will Bible, partner, U.S. Audit & Assurance digital transformation and innovation leader, Deloitte & Touche LLP.

Deloitte is also increasing AI fluency, training more than 120,000 professionals as part of the next generation of AI talent via the AI Academy, a Deloitte Technology Academy program, as well as

investing more than \$2 billion in global technology learning and development initiatives to boost skills in the application of key technology areas, including AI, to key industry and functional issues.

83. [The future is AI. The future is human](#)

Safely unlock AI's potential with responsible AI services

HIGHLIGHTS

Enterprises are experimenting with large language models (LLMs) and looking to unlock the promise of AI and generative AI (GenAI) for their business.

To mitigate the risks associated with AI and GenAI, businesses need to implement LLM-based solutions responsibly.

Our portfolio of responsible AI services, covering the entire life cycle of AI adoption, help enterprises get the best out of AI, safely and responsibly.

OVERVIEW

Responsible AI is the key to success with AI.

Hoping to unlock the promise of AI and generative AI (GenAI), enterprises have been rapidly prototyping solutions using large language models (LLMs) to solve their business problems. LLMs have lent themselves well for adoption by businesses and have shown promising results in industry-specific as well as industry-agnostic use cases. Across industries, enterprises are looking to deploy LLMs in production to realize increased productivity and other benefits. However, to identify and mitigate the risks associated with GenAI and AI in general, businesses need to implement AI-based solutions responsibly—with transparency, explainability, and in an unbiased and trustworthy manner. While there have been conversations around ethical AI, frameworks for responsible AI and AI usage are still evolving. Enterprises have not really explored or invested in responsible AI—until now.

Our proven framework for responsible AI implementation can help enterprises unleash the potential of AI and GenAI while ensuring responsible usage across their organizations.

SOLUTION

We offer responsible AI services for every stage of AI adoption.

We have a comprehensive portfolio of responsible AI services covering the entire lifecycle of AI adoption—from conceptualization of a solution to implementation to operations. Our services for responsible AI are built on a framework of five core tenets—secure, accountable, fair, transparent, and identity preserving—with metrics mapped to each of these tenets. By leveraging these services, enterprises can get the best of out of AI, safely and responsibly.

Our curated responsible AI offerings are aimed at driving purpose-driven, sustainable outcomes and include:

Responsible AI adoption strategy consulting: Working closely with CXOs and AI leaders at organizations, we define responsible AI principles and implementation strategies, identify or develop responsible AI frameworks and tools, create plans to implement AI responsibly, and establish governance models as well as approaches for the operationalization of AI-based solutions.

Responsible AI assessment: No matter where they are on their AI or GenAI journey—whether they are just starting out or have already implemented a solution—we help enterprises assess their maturity level for these technologies by scoring them against relevant metrics, and identify and mitigate potential risks and biases. Outputs from AI that may not align with an organization’s or jurisdiction’s requirements, policies, or ethical guidelines and results that foster existing biases are real risks. Using TCS’ patented solutions and services along with those of leading cloud service providers and our proven framework, we help mitigate risks and make enterprises compliant and AI and GenAI-ready.

Responsible AI design and implementation: Using our responsible AI framework and capabilities from both TCS and the leading cloud service providers we partner with, we embed ethical AI into the fabric of the AI systems being developed. Through this service, we help address challenges around security, privacy, bias, fairness, accountability, and explainability in already developed AI and GenAI-based solutions. At each phase of adoption—conceptualization, design, build, testing, and deployment—we ensure that models comply with the tenets of our framework, setting the stage for success with AI.

Responsible AI governance service: By applying our frameworks, methods, tools, and processes, we provide governance support for ethical use of AI and help ensure that enterprises’ AI initiatives comply with responsible AI principles. As part of this service, we offer enterprises our expertise in setting up an AI Office.

Throughout, our subject matter experts work closely with companies’ GRC (governance, risk, and compliance), security, and AI teams to ensure that the implementation of AI and GenAI-powered solutions meet responsible AI principles and comply with regulations.

BENEFITS

Unlock the power of AI safely.

Our services help enterprises address the many challenges that come with AI-based solutions. With us, they can:

Ensure responsible adoption of AI with clearly identified risks and mitigations.

Ensure AI is used solely for the intended purpose, and outcomes that may not align with an organization’s policies or ethical guidelines are checked.

Deploy robust security and privacy controls to prevent unauthorized or unintended use.

Adhere to lawful, ethical, and social responsibilities.

Comply with country-specific laws and guidelines related to AI-based solutions.

Enable continuous monitoring and alignment of AI-based solutions to enterprise goals.

THE TCS ADVANTAGE

Get an edge with our rich pool of AI talent and strong partnerships.

A partnership with us comes with the following advantages:

Deep expertise: TCS has decades of experience in researching and developing AI-based solutions to solve complex business problems. Our Research and Innovation unit builds cutting-edge, customized AI models and solutions for customers across the globe.

Scale and skilled resources: TCS is the second largest IT services company in the world, with over 600,000 people. We have a large workforce of AI-skilled associates to support enterprises across geographies in their AI transformations.

Strong partnerships: TCS has strong partnerships with all the major players in the AI ecosystem. Through our partnerships, we enable innovative solutions for enterprises.

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84. [Responsible ai](#)

Responsible AI

Trend 16: AI security emerges as the bedrock of enterprise resilience

Responsible AI is not only an ethical imperative but also a strategic advantage for companies looking to thrive in an increasingly AI-driven world. Rules and regulations balance the benefits and risks of AI. They guide responsible AI development and deployment for a safer, fairer, and ethical AI ecosystem.

Staying informed about associated compliance requirements is vital for organizations and individuals, especially amid industry lawsuits related to generative AI. Novelist John Grisham has taken OpenAI to court, and programmers allege Codex crawl their work but don't [treat attribution, copyright notices, and license terms as legally essential](#). Meanwhile, visual artists have targeted Stability AI, Midjourney, and DeviantArt for copyright infringement. Regulations to significantly impact the industry's trajectory, shaping growth, innovation, market entry, and ethical practices. Businesses must proactively respond to evolving AI regulations, incorporating them into a strategy for compliance, trust, and long-term success.

AI's dual role presents a dichotomy: it can automate hacking, sidestepping traditional security, yet simultaneously bolster security through anomaly detection, threat prediction, and real-time monitoring. This interplay necessitates continuous adaptation to stay ahead of risks. AI security is vital for the integrity of applications across domains, shaping the industry's future by addressing critical concerns like data privacy, integrity, and fairness.

Businesses should approach AI security with a multifaceted strategy by implementing robust security measures, regularly updating AI models, conducting risk assessments, educating employees, using AI-based security tools, addressing ethical considerations, and collaborating

with experts. Businesses can also leverage AI-driven security tools for advanced threat detection, anomaly detection, and real-time monitoring, augmenting their overall security posture. Lastly, collaborating with AI security experts and staying updated on emerging threats and best practices is essential for proactive adaptation to the dynamic security landscape. These comprehensive measures collectively fortify AI security, instilling trust and resilience in AI initiatives while safeguarding systems and sensitive data.

85. [ChatGPT a game changer for artificial intelligence](#)

ChatGPT is the topic on everyone's lips. What can it do? How does it do it? And is my job safe? We take a closer look at this revolutionary generative artificial intelligence and analyze what it can (and cannot) do. In particular, we focus on its impact on business and ability to transform a wide range of activities along your value chain. Given its significant capabilities, top managers would be ill advised to bury their heads in the sand. Generative AI needs to be addressed – so you can harness its potential for your business.

The launch of ChatGPT in November 2022 caused something of a storm. Just three months later, the website was enjoying around one billion visits a month and 25 million visitors a day. These shockwaves are still being widely felt across the business world.

ChatGPT is perhaps the best of the artificial intelligence (AI) chatbots released to date. It quickly went viral because of its unique characteristics, especially its human-like, intuitive answers, its knowledge and its versatility. Of course, it still demonstrates certain limitations, such as the information it draws on not being completely up-to-date and its poor tracking of sources. But the race is now on to overcome these deficiencies, and the true potential of what ChatGPT can do remains unknown.

ChatGPT is an example of generative AI, which uses deep-learning algorithms to create novel content, ranging from text and images to music and 3D models. This technology has made rapid progress in recent years.

Not only does generative AI offer clear benefits across the entire value chain, it also has the potential to disrupt a wide range of sectors – including the [tech industry](#). Top managers must address its potential as a matter of urgency or face the dire consequences of being left behind by their competitors.

A wide range of use cases

Apart from creating content, design, music and the like, ChatGPT can have a great impact on automating tasks and reducing costs for companies. It is particularly useful in areas such as data analysis, pattern recognition and predictions, leading to improved decision-making and problem-solving.

In manufacturing, for example, generative AI has [automation and efficiency potential](#) along the entire value chain. It can transform trend detection and data analysis, as well as information retrieval and translation to improve R&D. In production planning it can help with inventory management, resource allocation and capacity planning. At the other end of the value chain, in

aftersales service, it can transform referrals, automation maintenance and service requests. The extent of its impact in each of these areas varies, as shown in the illustration below, depending on the area's potential for automation. But its transformative power is unquestionable.

86. [Digital transformation practice](#)

Clearsight Advises Grupo ASSA Worldwide (gA) in its Acquisition by Globant

[Clearsight Advisors, Inc.](#) (“Clearsight”) is pleased to announce another highly successful transaction in its Digital Transformation practice. Clearsight served as financial advisor to [Grupo ASSA Worldwide](#) (“gA”) in its acquisition by [Globant S.A.](#) (NYSE: GLOB) (“Globant”). This deal marks Clearsight’s second LatAm transaction since June and the fifth overall transaction since April.

Grupo ASSA Worldwide is a digital business consulting company with 1,100 IT professionals that enables strategic and operational efficiency through its practiced expertise in enterprise technology and business process management solutions. Headquartered in Miami with a presence in the United States, Argentina, Brazil, Chile, Columbia, Mexico and Spain, gA provides global business solutions for the life sciences, manufacturing and CPG industries through its service platforms powered by artificial intelligence and machine learning technology. The acquisition of gA will further enhance Globant’s nearshore delivery and process automation capabilities as a global leader in digital innovation. gA will also contribute to Globant’s strategic client relationships with Fortune 500 companies looking to innovate through cloud migration, disruptive media and enterprise applications.

Roberto Wagmaister, gA Founder and CEO, celebrated the deal closure, saying, “As a global business, trying to find the right advisor who understands not only the nuances of digital innovation, but the complexities around delivering on a global scale was a challenge. We chose Clearsight because of their industry knowledge, global experience and the expertise they demonstrated from our very first interaction. The Clearsight team was dedicated to both finding the best strategic partner for gA as well as optimizing our transaction. We could not be more pleased with our selection of Clearsight as our strategic financial advisor.”

[Joel Kallett](#), Managing Director and Co-founder of Clearsight remarked, “I am thrilled for Roberto and his entire team at gA. It is clearly evident that they have built a phenomenal culture and finding the right partner in Globant was a critical step for their continued growth. This highly strategic transaction signifies the continuing evolution of the digital innovation ecosystem as the combined entity now has an even more complete set of services for their top tier client base. I look forward to witnessing the positive impact this partnership will have for their clients across the world seeking to innovate their business models.”

87. [Optimizing performance with artificial intelligence](#)

Artificial Intelligence (AI) has emerged as a transformative force in optimizing production performance across industries. As businesses strive for operational excellence, leveraging AI

technologies has become increasingly crucial. Understanding the economic landscape and trends surrounding AI in production performance is essential to stay competitive in the evolving market.

Organizations face a range of challenges when implementing AI for production performance. These include data complexity, integrating AI into existing systems, ensuring data accuracy, addressing workforce concerns, and managing risks associated with AI adoption. Overcoming these challenges is essential to unlock the full potential of AI in driving production efficiency and effectiveness.

< Learn more: [Mastering data governance: navigating challenges and unlocking value](#) >

Application of AI presents promising prospects

Falconi partnered with a client to successfully implement AI for production performance improvement. By leveraging machine learning algorithms, the client achieved significant advancements. Predictive maintenance reduced equipment downtime by 30%, resulting in improved production uptime and cost savings. AI-based anomaly detection improved product quality by 20%, leading to higher customer satisfaction and reduced waste. Through Falconi's expertise, the client experienced a 15% increase in overall production efficiency.

Looking ahead, the application of AI in production performance presents promising prospects for organizations embracing this technology. By adopting Falconi's recommended strategies and AI solutions, companies can unlock benefits such as optimized resource allocation, enhanced decision-making, improved product quality, and increased overall equipment effectiveness. Organizations that embrace AI as a strategic asset can gain a competitive edge and achieve higher levels excellence.

< Learn more: [Navigating industry 4.0: leveraging data and technology for manufacturing success](#) >

Falconi's expertise in AI for production performance optimization empowers organizations to overcome challenges and drive remarkable success. By implementing AI technologies and machine learning algorithms, businesses can unlock the full potential of their production processes. Take the next step towards optimizing production performance with AI by contacting Falconi today.

Explore how our tailored solutions can revolutionize your operations, reduce costs, and enhance productivity. Visit our website, or schedule a meeting to discover the transformative power of AI in driving production performance with Falconi. Embrace AI to unleash the true potential of your operations and stay ahead in the competitive landscape.

88. [AI powering innovation and productivity](#)

An enterprise-grade implementation of ChatGPT, a natural language interface to our data warehouse and an automated generator of logic trees. These are just some of the ways Nous Group is using generative AI to support its consulting work with clients around the world.

Over the past year, expert consultants from across our international network have been exploring the capabilities of AI (artificial intelligence) to understand how it can improve productivity and drive better outcomes for our clients, their communities and our consultant teams.

Nous Principal Rob Ewin, lead of our AI working group, said: “AI brings exciting opportunities to reexamine our approach to a growing array of processes. It has the potential to free up our clients and our people so they can spend more time and energy on higher-order problem solving that delivers better outcomes and bigger impact.

“Across sectors, there’s great enthusiasm to unearth and harness AI’s value. This is exciting but it must be supported by systems that safeguard the accuracy of output and the security of information.”

Creating the right conditions for innovation and development

Our enterprise-grade implementation of ChatGPT, known as NousGPT, runs on customised Microsoft technologies and operates as a closed loop system, enabling our teams to safely experiment and develop their skills in AI.

Nous Principal [Sophie O’Connor](#), our Project Excellence lead, said: “In building NousGPT, we’ve created a safe environment for our consultants and corporate teams to develop their confidence while getting a practical understanding of how AI can deliver greater value.

“Investing in our people and our capabilities is a key focus at Nous. AI is moving fast – how we adopt and adapt now will set us up for bigger success down the track.”

Going beyond the chat interface

Nous’ experimentation with generative AI has included prototyping two internal productivity tools, known as DawnGPT and Diana.

Nous Principal [David Diviny](#), our Chief Data Scientist, said: “Generative AI can be so much more than chat bots. Thinking beyond a chat interface has the potential to scale the productivity impact of generative AI.

“This requires a deep understanding of a user’s tasks and how generative AI can overcome limiters to the ideal experience of that task.”

Our first productivity tool is DawnGPT, a natural language interface to the Data Assets Warehouse at Nous (DAWN), which brings together proprietary data and public information to facilitate rapid analysis. DAWN includes data on topics including population, human services, economic indicators, tertiary education and job advertisements.

DawnGPT provides an intuitive interface that seamlessly translates natural language into structured query language (SQL), providing consultants with a means to access data and an avenue to hone their SQL skills. The data results can then be visualised interactively or as a PowerPoint and a narrative can be generated to complement the results.

DawnGPT seamlessly translates natural language into structured query language.

Our second productivity tool, Diana, generates logic trees for structured problem solving that breaks down a question or problem into its constituent parts. It is essentially a visual representation of structured thinking, with each branch representing a subset or component of the main question.

David said: “Diana uses generative AI to give our consulting teams a head start on projects. It is not the end solution, but the beginning of a creative problem-solving process.

“The possibilities for applications like these are endless and it’s an exciting journey to be on.”

All use of AI at Nous is guided by clear principles to ensure its use is safe, secure and generates genuine value that enables our teams to push the thinking even further and deliver higher quality work for our clients.

89. Future of Africa International Advisors Group

In a rapidly evolving world, keeping up, let alone staying ahead requires radical shifts both in terms of how we see the world, but also in terms of how we adopt technology to succeed.

At AIA, we understand the importance of positioning companies and economies for the future. Our Futures Practice combines the essential elements of People and Technology, empowering organisations to thrive in the face of rapid change.

PEOPLE: THE DRIVING FORCE OF TRANSFORMATION

Technology exists to enable people. People are the heart of any organisation or system and therefore people must be placed centrally in our view of the future. Our Futures Practice places a strong emphasis on people side of the equation, ensuring that the New Ways of Work, Agile Operating Models, and AI are integrated and drive towards better human performance.

We thus help companies cultivate both the environment as well as the capacity for people as they adapt and excel in the future landscape. By re-organising towards ever greater people and technology convergence and integration, we seek to unlock untapped capabilities, nurturing innovative thinking, and fostering a culture of continuous learning.

TECHNOLOGY: UNLEASHING THE POWER OF INNOVATION

Technological advancements are reshaping industries at an unprecedented pace. Our Futures Practice understands that harnessing the potential of technology is vital for sustainable growth. We guide companies in identifying the right technologies and implementing cutting-edge solutions that align with their strategic objectives. From artificial intelligence and automation to blockchain and the Internet of Things (IoT), we navigate the complex landscape of emerging technologies to unlock new opportunities for your organization.

FORWARD-THINKING STRATEGIES: CHARTING YOUR COURSE

Successfully navigating the future requires more than just reacting to change—it demands a proactive and strategic approach. Our Futures Practice helps you chart your course towards a thriving future. We collaborate closely with your team to develop robust strategies and roadmaps that consider emerging trends, market shifts, and evolving customer expectations. By aligning your organization with the trajectory of change, we position you as a trailblazer in your industry.

Utilising long-term thinking frameworks, including scenario planning, we can ensure that you proactively adapt, leading change and driving long term success.

INNOVATION ECOSYSTEMS: CONNECTING FOR SUCCESS

We recognize that no organization can thrive in isolation. Our Futures Practice leverages our extensive network and expertise in building collaborative innovation ecosystems. By forging strategic partnerships, fostering cross-industry collaboration, and connecting you with the right stakeholders, we create a fertile ground for innovation and growth. Together, we unlock new possibilities and amplify your collective impact.

THOUGHT LEADERSHIP AND RESEARCH: INSIGHTS FOR TOMORROW

In the rapidly evolving landscape, knowledge is power. Our Futures Practice prides itself on staying at the forefront of industry trends, disruptive technologies, and emerging best practices. We conduct rigorous research, analyse market dynamics, and generate actionable insights that inform your strategic decision-making. With our thought leadership and research expertise, you gain the knowledge and foresight to make informed choices and seize opportunities that drive your organization forward.

Join us in shaping a future filled with promise and endless possibilities. Unlock the full potential of your organization and position yourself for success in the dynamic world that lies ahead. With our Futures Practice as your trusted partner, you can confidently navigate the complexities of tomorrow, achieve sustainable growth, and thrive in the face of uncertainty.

90. [Nike leveraging AI in operations](#)

Background

Nike, a global leader in sportswear and athletic footwear, has long been at the forefront of innovation and customer engagement. In recent years, the company has made substantial investments in Artificial Intelligence (AI) and other emerging technologies to transform not just its products but also its customer experience, supply chain, and IT operations. This drive towards

tech-enabled solutions has been especially significant in the face of the global pandemic, which pushed consumers and businesses more towards digital platforms. Nike has collaborated with partners like Cognizant to modernize its IT infrastructure, offering both onsite and remote support across a wide range of hardware and applications. With a focus on sustainability, customer engagement, and operational efficiency, Nike's AI journey represents a compelling case study in corporate innovation.

Key Takeaways

Nike employs AI to enhance customer experience through hyper-accurate shoe fitting, personalized offers, and virtual assistants.

Advanced analytics and AI-driven strategies have been adopted in Nike's supply chain to improve speed, accuracy, and sustainability.

Collaboration with IT major Cognizant to bring in hyperautomation and AI into Nike's technology operations, aiming for improved service productivity and cost savings.

Challenges include data privacy concerns, achieving 24/7 customer service accessibility, and ensuring the sustainable use of technology.

Deep Dive: How Nike is Leveraging AI Across its Operations

Approach

Nike's approach to AI is holistic, covering a wide array of applications from customer experience to supply chain management. In customer engagement, Nike uses AI-powered apps that offer hyper-accurate shoe fitting and personalized recommendations. The company also employs AI for deep customer analytics, aided by its acquisition of Zodiac, a data analytics firm. On the supply chain side, Nike has integrated AI and machine learning to predict product demand and to forward-position popular products, reducing lead times and improving service quality.

Implementation

Nike has been pragmatic in its AI implementation. Customer-facing AI solutions include an app that employs augmented reality and a 13-point measuring system for shoe fitting. In its supply chain, the company has opened multiple regional distribution centers fueled by AI algorithms to meet localized demand more effectively. Furthermore, through a five-year agreement with Cognizant, Nike is enhancing its global technology operations. This includes multilingual IT customer service, deskside and dispatch depot, as well as application and infrastructure support.

Results

Nike's AI initiatives have been quite successful. The AI-powered apps have not only improved customer relationships but have also provided valuable data for product design and inventory management. Nike has also tripled its digital order capacity in specific markets thanks to AI-enhanced supply chain operations. The collaboration with Cognizant is expected to bring new self-service capabilities, improve service productivity, and offer significant cost savings.

Challenges and Barriers

While Nike has seen significant gains from its AI investments, challenges do exist. Data privacy is a significant concern given the vast amount of customer data collected through various apps. The ambition for 24/7 customer service through AI tools like chatbots also poses its own set of challenges, including maintaining the quality of service. Additionally, the drive for sustainability requires Nike to continuously scrutinize its tech-enabled operations for environmental impact.

Future Outlook

As consumer behavior and technology continue to evolve, Nike is poised to further its AI capabilities. Plans likely include the expansion of AI in customer service applications, increased automation in the supply chain, and deeper collaborations with tech partners like Cognizant. Given its past performance and strategic focus, Nike's AI initiatives will undoubtedly continue to play a significant role in shaping both the company and the broader retail industry.

Conclusion

Nike's journey in AI represents a well-rounded strategy that touches multiple facets of the business, from customer experience to supply chain and IT operations. By focusing on delivering personalized experiences, optimizing operations, and tackling challenges head-on, Nike serves as a textbook example of how AI can be effectively implemented in a large, global enterprise. Its efforts in AI have not only improved its bottom line but have also set the stage for future innovations that will likely continue to redefine the retail landscape.

91. [Ralph Lauren testing AI](#)

Ralph Lauren is leveraging early learnings from existing artificial intelligence use cases to [test generative AI](#) across a range of business functions, company leaders shared.

The apparel manufacturer and retailer is already using AI and machine learning in inventory optimization, forecasting, and consumer engagement, and it will test use of generative AI for such use cases as copy editing, graphics, and computer programming, CFO and COO Jane Nielsen said in an earnings call with investors, according to a transcript.

The strategy aligns with efforts by other companies in the industry [that are similarly exploring](#) the use of the fast-moving technology. The experimental nature also dovetails with other pilots by Ralph Lauren during its most recent quarter, including launching its first NFTs in partnership with the [Poolsuite](#) platform and its Web3 community,

See also: [Generative AI Frenzy Burns On As Most Execs Rank Benefits Over Risks: Gartner](#)

Ralph Lauren, which is leaning into the luxury market as part of its longtime growth plans, added 1 million new consumers to its direct-to-consumer business during the fourth quarter, to reach a total of 5 million new DTC consumers this fiscal year. It also reached 52 million social media followers globally.

“Our direction of travel from a strategic standpoint is to pivot the company further into DTC,” said CEO Patrice Louvet. “Our DTC today is about 63%, 64% of [revenue] for the total company. And as we guided during Investor Day [in September 2022], we expect the numbers to be north of that in the coming years.”

Sales for Ralph Lauren’s digital ecosystem, which includes directly operated sites, pure-play, department store dot-coms, and social commerce, increased high-single digits during the year. Owned digital sites alone saw sales grow mid-single digits, and the company has put user experience enhancements through digital content and more customer personalization on its roadmap for the upcoming fiscal year.

Though Q4 revenue grew 2% in North America, retail comp-store sales dipped 4%. Physical retail remains a core component of its bid to drive connected commerce, and Ralph Lauren welcomed 21 new stores and concession-based shop-in-shops around the world in Q4. This included a particular emphasis in China, which the company expects to remain one of its fastest-growing markets.

The company, which has closed two-thirds of its wholesale doors in North America over the last three to four years, plans to [open 250 stores over the next three years](#).

92. [AI designer creating fashion grails from iconic runways](#)

Though their eyes have a holographic quality and their flesh appears to have been oxygen-starved, there’s an uncanny magnetism to the models that [Field Skjellerup](#) works with. The fashion archivist has been experimenting with AI for the best part of two years, feeding images of vintage Japanese fashions through a GAN model – a recent innovation in machine learning – to eerie and convincing effect. He’s created sculptural puffers with slashed waistbands, metallic concertina skirts, and avant-garde parkas festooned in artfully-arranged piles of rubbish. Prompted by images of [Junya Watanabe](#) AW04, [Hussein Chalayan](#)’s AW00, and Kosuke Tsumura’s [Final Home](#) project, the images look as though they’ve been pilfered from some kind of cybernetic mind bank.

“I’ve spent the majority of my adult life working dead-end jobs for minimum wage and I have little to no relationship with any educational institution,” he says. “But this is such a powerful tool. I’ve managed to create the blueprint for the most hyped pair of sneakers in the world, and I think that’s really saying something.” Skjellerup’s referring to a series of Nike shoes that he showcased on Instagram last week, which look almost exactly like the kind of thing [Simone Rocha](#) would design, surfaced in laser-cut mesh, rubberised petals, and ribboned laces. Far from the haunted [DALL-E](#) renderings that have been popularised online – all scorched edges and [Francis Bacon](#) wails – Skjellerup’s creations manage to look real. “People think they’re physical products and have asked me how to purchase them. I’m just waiting on the call from Nike!”

As exciting as this may be for STEM enthusiasts, the advancements made in AI fashion often give way to real-life anxieties. If a machine can learn the handwriting of a brand and outpace its atelier, what’s to say that designers won’t be rendered obsolete? “I feel like people’s fears are warranted but the idea that artists will be eradicated is a little far-fetched,” Skjellerup says. “There will be job losses but I think new movements will arise from automation, people will put an onus on ‘human-made’ products. Am I setting an example for this kind of thing? I’m not sure I have an answer for that yet.” If creativity was once understood to be a uniquely human accomplishment, then AI has also inherited its prejudices – regurgitating images of rakish models with the spindly legs of a vaudevillian puppet. The algorithm can make our lives easier, but it’s often as flawed as we are.

Ultimately, humans choose how these systems are made and what data they are exposed to – and the consequences can often be severe. In January 2020, Robert Williams, a Black man in Detroit, was arrested for a crime he did not commit because of an incorrect facial-recognition match. AI (much like the cameras they have been trained by) are rubbish at recognising people with darker skin tones, which is a standard that dates back to when film cameras were optimised to capture the faces of light-skinned people. “I’d admit this has been the trend with the majority of my published imagery to date,” Skjellerup says. “Given the racial bias in these pre-trained models, it’s easy to fall back on whiteness as the default. My hope is that the companies creating them will change but I’d personally like to make improvements in producing imagery that includes all kinds of people.”

For Skjellerup, who also runs [an impressive sales platform](#) of archival [Comme des Garçons](#), [Issey Miyake](#), and Yoshiaki Hishnuma (amongst hundreds of other grails) AI is first and foremost a research tool. Albeit somewhat fictional, his work has the potential to breathe new meaning into some of fashion’s most seminal collections – locked into a constant process of sampling and recontextualising. It means that even the most legendary designers will be able to live forever – their body of work absorbed and reproduced by the algorithm. “The development of AI tools will mark the biggest change in all mediums of art for the next 100 years,” he says. “Integration will be fraught with ethical and legal discussions and radical new ways of art making. Not only will people use these systems to play into pre-existing processes but new modes of expression will also be created.”

93. [AI and change in management](#)

Shiseido, the 140 year-old Japanese cosmetics business, is using innovation and technology to drive gradual transformation across all of its 26 brands to prepare them for the future.

“The company realised that the traditional way of working wasn’t sustainable any more,” Alessio Rossi, the company’s New York-based global chief digital officer, told an audience at the recent dmexco conference.

“So they had to shift gears and promote change across the organisation, not just in digital, but innovation can come from the supply chain or anywhere.” (For more details, read WARC’s report: [Change management at scale: how Shiseido is using data and AI.](#))

Internal initiatives include the Shiseido Digital Centre of Excellence, launched last year to oversee change management related to all things digital and to prioritise areas of focus, and SHISEIDO+, a digital academy enabling staff to learn how to integrate new technology into what they do.

“Shiseido has the objective to become a leading company in consumer intimacy in the beauty industry, which is really powered by data,” Rossi explained.

“We think if we know more about them, we have to talk less, we have to interrupt less, we can interject in consumers’ lives in a way that is relevant.”

Artificial intelligence is playing a vital role in this, by making sense of the huge volumes of data the company and its brands have access to.

A project involving IBM Watson’s artificial intelligence tool Lucy, for example, is helping marketing staff understand the data by asking Lucy questions, framed in natural, conversational language and getting answers to things like the correlation between investment in social media spending and growth in market share.

Rossi acknowledge that staff could be fearful of the implications of AI for their own jobs but offered reassurance.

“AI at Shiseido isn’t replacing anybody, it’s helping people and actually creating jobs because training Lucy to understand beauty is not an easy exercise.

“We’re creating a new class of professionals that didn’t exist before.”

94. [Joins stanford development program](#)

LVMH Moët Hennessy Louis Vuitton has announced its collaboration with Stanford University’s Institute for Human-Centered Artificial Intelligence Institute (Stanford HAI) to explore the applications of AI technology in its business.

As part of LVMH’s commitment to leveraging cutting-edge technologies to enhance customer experiences and optimize operations, the Group has been utilizing artificial intelligence in various parts of its value chain for several years. Recent generative AI breakthroughs show new opportunities for major innovation and efficiency but also challenges and risks. LVMH will accelerate the efforts to learn and experiment how it can help the business.

” Artificial intelligence is a powerful technology. We acknowledge the value that it can bring as support and complement to human talent, emotions and creativity, that are core to our Maisons.” said Antonio Belloni, LVMH Group Managing Director. “We are proud to partner team up with Stanford HAI in our efforts to learn how to leverage and manage AI potential.”

LVMH will collaborate with Stanford HAI on research projects, concentrating on areas such as AI safety, human-centered design, human-computer interaction, and foundation models to develop new applications of artificial intelligence technology in customer experience, product design, marketing content & communication, manufacturing, supply chain management and more.

“Stanford HAI’s mission focuses on how to properly design and build human-centered AI to have positive human impacts,” said James Landay, vice director and director of research for Stanford HAI. “It’s key to collaborate with industry leaders like LVMH who are steeped in design expertise to ensure technology is developed with people top-of-mind.”

95. [AI and innovation](#)

SUMMARY 1. STRIVE FOR OPERATIONS EXCELLENCE THROUGH AI 2. INNOVATION

AI AND INNOVATION 4 Awareness Proof of concept Adoption TECHNOLOGY MATURITY Industrialization SIMPLIFIED – ILLUSTRATIVE Blockchain AR & VR Chatbot Assistants Disruptive materials 5G Delivery 4.0 Image Recognition Voice Commerce Kering AI factory's

focus DATA SCIENCE AND ARTIFICIAL IN AI IS BRINGING A WIDE SCOPE OF GAME-CHANGING APPLICATIONS 5 ROBOTICS MACHINE LEARNING EXPERT SYSTEMS PLANNING & OPTIMIZATION SPEECH VISION LANGUAGE PROCESSING Predictive analytics Topic extraction Deep learning Classification Translation

THE AI FACTORY RELIES ON A LARGE RANGE OF DATA SOURCES 6 DATA LAKE & AI PLATFORM OPEN DATA Postal code Geolocation mapping Special events SUPPLY DATA Inventory in network Replenishment data Store data PRODUCT DATA Price Style Color & Size Product Attributes SALES DATA Sales in value Product volumes Sales location and date CRM DATA Client contact Segmentation Purchase behavior Opt-in/Opt-out WEBSITE DATA Web views Online Conversions

AI WILL BRING A COMPETITIVE ADVANTAGE TO BRANDS: HENCE, WE ARE LEVERAGING THE BEST CAPABILITIES AND TALENTS TO ACCELERATE 7 IMPLEMENT CUTTING EDGE TECHNICAL CAPABILITIES FOCUS ON MVP AND INDUSTRIALIZATION RATHER THAN POC ENSURE CLOSE INCLUSION OF BUSINESS REQUIREMENTS • Upgrading Kering data lake to store all data sources and ensure data availability; Manage huge amount of unstructured raw data • Leverage cloud platform (scalability, AI) and ability to rollout models in production • Strategic bias in favor of Minimum Viable Products (= the most minimal form of a complete solution) to test in real conditions as soon as possible • Aiming for rapid industrialization at full scale for projects with proven added value • Onboarding the brands from day 1 • Starting all projects with a sponsor brand • “The hardest part of AI is not the code, it is the change management around” BUILD A UNIQUE TEAM OF TALENTS • One team / One roof / One floor blending data scientists, data engineers, data developers & data managers • Leverage agile method to foster innovation and adopt new technologies Phase 1 Prototyping & validating opportunities 2018 2019 2020 Phase 2 Building capabilities Phase 3 Scaling up & industrializing

WE PRIORITIZED AI PROJECTS AMONG A LARGE SPECTRUM ON THE VALUE CHAIN 8 Trend prediction Buying product scoring Supply chain Replenishment & Store-to-Store optimization Store location evaluation Ideal store layout Customercentric store assortment CRM & clienteling Price Premium optimization Precision media Store workforce planning Automatic product tagging Markdown optimization Performance management: Sales forecasting (global, country, store level) DESIGN BUYING & MERCH. PRODUCTION LOGISTICS STORE LAYOUT MARKETING SALES Demand planning I P P Collection structure optimization I P S S I I I I I C I I Ideation P Prototyping & validation C Building capabilities S Scaling up & industrializing

FOCUS ON SUPPLY CHAIN PYTHAGORAS PROJECT: ASSIST PLANNERS IN OPTIMIZING STORE REPLENISHMENT STRATEGIES 9 LIVE IN JUNE 2019 • Develop a new AI-driven short-term sales forecast model and (as a second step) a replenishment-optimization model in close relationship with Gucci replenishment teams • Integrate AI outputs in existing planning tools • Assist planners in optimizing product quantities to ship to stores in order to reduce inventory shortages and overstocks • Start with two categories in Europe 06.19 07.19 08.19 09.19 10.19 11.19 12.19 01.20 EXPECTED BENEFITS What? How? Key milestones Forecast live in planner’s tools Rollout of forecast to all products and regions launched Launch study on replenishment optimization

INCREASED FORECAST ACCURACY • ~20% more accurate on one of the categories • Forecast "Newness" products with no historical data • Maximize sales at full price • Maximize gross margin LOWER RISK OF INVENTORY SHORTAGES OR OVERSTOCK Thanks to an improved reaction to market variability, in particular for items with a few weeks of historical data SMOOTHER PROCESS Thanks to a more reliable forecast and simplified validation tool FOCUS ON SUPPLY CHAIN PYTHAGORAS PROJECT: ASSIST PLANNERS IN OPTIMIZING STORE REPLENISHMENT STRATEGIES 9 LIVE IN JUNE 2019 • Develop a new AI-driven short-term sales forecast model and (as a second step) a replenishment-optimization model in close relationship with Gucci replenishment teams • Integrate AI outputs in existing planning tools • Assist planners in optimizing product quantities to ship to stores in order to reduce inventory shortages and overstocks • Start with two categories in Europe 06.19 07.19 08.19 09.19 10.19 11.19 12.19 01.20 E FOCUS ON PRICING PROJECT: FIND THE OPTIMAL MARKDOWN LEVEL Develop new AI-driven price-sensitive sales forecast model • Develop a pricing optimization model • Find out the optimal markdown level for each product • Start with women's and men's shoes in Europe for new 2019 Fall season What? How? First results & next steps • Promising results for the sales forecast: high accuracy, although some outliers need to be understood • Price sensitivity analysis: forecasts are dependent on prices and this sensitivity is variable across products • We are running optimization methods to find the best combination of discounts BEYOND SUPPLY AND SALES, WE BELIEVE THAT AI WILL HAVE A WIDE IMPACT ON A LARGE RANGE OF KERING ACTIVITIES 12 Used for current projects Being assessed for future projects • Inbound message ranked by priority • Personalized e-mail proposition • Media spend optimization (precision marketing) • Resume screening • Employee churn prediction • Career path counselling • Counterfeit detection • Trademark tagging on product images Planning & Optimization _ Machine Learning _ Image Recognition _ Language Processing _ Machine Vision _ Expert Systems INNOVATION ROADMAP 16 IN-STORE / ONLINE / CLIENT SERVICES In-store: Technologies to augment Client Advisors Online: Technologies to improve user experience and drive more conversion Client services: AI-based technologies to augment Client Services Advisors and improve performance and monitoring INNOVATION ECOSYSTEM SET-UP Partnership with Venture Capitalists Start-up scouting TECH SCOUTING Blockchain Voice / Chatbot Image recognition INTRAPRENEURSHIP / CULTURE Idea crowdsourcing Co-design MATERIAL DISRUPTIONS NEW BUSINESS MODELS New ways to consume luxury (e.g. subscription, second hand, rental) New ways to engage with consumers DISRUPTIONS IMPACTING OUR BUSINESS MODEL TECHNOLOGIES IMPROVING VALUE TO CUSTOMERS & OUR PERFORMANCE ENABLERS INNOVATION FUNNEL 17 1 IDEAS 2 POC 3 MVP 4 ROLLOUT INVESTIGATION EXPERIMENTATION PROJECT LIVE

- Assess tech/solution maturity • Assess what is at stake • Identify use case • Test feasibility • Test fit with business need • Identify features that deliver the most value • Roll-out at small scale • Maximize learnings for the least efforts • Run in production • Deploy RESULTS FOCUS Prioritized list of use cases Go / No go on feasibility & usability Feedback on solution Industrialized version of solution

96. [AI powered Case study](#)

CASE STUDY: Sitation's AI Powered Content Creation tool, RoughDraftPro Solves Product Content Creation Challenges At Scale Inaccurate and Missing Product Descriptions on 3,000+

priority Amazon products Incomplete Product Records and Data Gaps Inconsistent Branding Across Global Sales Platforms Lack of Resources to Create Quick and Accurate Challenges Havaianas, in pursuing its corporate goals for large growth in the US market, recognized the need for specially-created and localized product content at scale. The digital team soon realized that generating top-notch and precise product content at an enterprise scale was beyond their existing resource capacity. Leveraging Sitation's AI content tool, RoughDraftPro, and a direct PIM integration for automation, Havaianas was able to generate product content for its US product assortment on Amazon in a matter of days. High Quality and Consistent Product Content Especially Crafted for the Havaianas target consumer on Amazon.com Quick creation of Product Titles, Descriptions, Feature Bullets, and SEO Keywords for 3,000+ items Create a scalable and repeatable approach to include brand tone and voice for future content creation Goals H Approach Havaianas leverages AI Content Tool, RoughDraftPro for a consistent & scalable solution Leveraged machine-assisted process to correct existing inaccuracies Crafted prompt models to accurately reflect brand tone and voice, and data format requirements Integrated with Akeneo PIM for workflow and automation Sitation transformed product content into precise, hyperlocalized, and on-brand product representations at scale. RoughDraftPro generated results that matched the specific marketplace format requirements, while incorporating the vivacious spirit the brand is loved for. Results Accurate and Consistent Product Information Across 3,000+ Priority PLPs at Amazon Foundational Prompts to Facilitate Continual Content Creation at speeds of up to 30,000 pieces/hour. Product Data Completion and SEO Strategy True to Brand Tone and Voice Product Descriptions Akeneo Integrated Product Descriptions RoughDraftPro and content creation is one of the many facets of a successful, ongoing Havaianas and Sitation Partnership. RoughDraftPro facilitates content creation and refresh for crucial sales channels at scale, while maintaining the authentic brand identity of Havaianas across thousands of globally offered shoes and apparel. Silvain explains, "if we weren't using RoughDraftPro and working with Sitation, we would still be in a place of creating one product description at a time without the staff to do it."

[97. Falabella hires Amelia as a digital assistant for its employees](#)

Through a statement, Amelia, the leading company in conversational business artificial intelligence software, confirmed that the Chilean giant Falabella hired its digital services assistant to improve the internal experience of its 100,000 employees with 24-hour internal support , 7 days a week.

As confirmed by the document, the retail company sought to optimize the handling of support tickets and eliminate long wait times for information technology (IT) services, such as account unlocking and password resets, among others.

In this way, Falabella frees up the time and resources of its IT team, made up of up to 100 people, so they can focus on more challenging problems.

"We hired Amelia as the first point of contact for IT support, as she can integrate seamlessly with our support platform, and now our users can easily interact with her through conversational AI to get help," explains Oscar Muñoz , director of employee experience technology at Falabella.

Regarding the above, it is worth mentioning that Amelia will provide a hand to Falabella employees with IT-related queries through voice and chat.

After the news was announced, Chetan Dube, CEO of Amelia, highlighted Falabella for its work in providing its employees with extraordinary experiences and stimulating them in terms of productivity, innovation and growth.

"By hiring Amelia as an IT services digital assistant, the company is taking important steps in its digital transformation journey, thanks to conversational AI and automation. We are excited to work with Falabella to bring new levels of service and efficiency to its workforce," says Dube.

Headquartered in New York City with offices in 15 countries, Amelia's technology currently impacts more than 200 brands in various sectors worldwide.

98. [How Cotton On Is Taking the Aussie Aesthetic Global with AI](#)

How Cotton On Is Taking the Aussie Aesthetic Global with AI

Is content creation slowing you down? Let's pick up the pace. Learn how Aussie brand Cotton On is using visual AI to save time and make smarter decisions, faster.

Discover how Cotton On uses Dash Hudson to:

Use AI to create high-performing photos in real-time to effectively increase engagement.

Leverage data-backed insights to select content to re-post and which Australian influencers to showcase and collaborate with.

Craft strategic campaigns across the brand's most important marketing channels

Revolutionizing Content Creation

Cotton On knows its laid-back Aussie style is best showcased on the ultimate visual marketing channel, Instagram. The missing piece? Data to back the social team's creative process. In the especially crowded space of apparel on social media, the Aussie brand needed its content to stand out amongst a sea of competitors and to create imagery faster to scale effectively. To do so, Cotton On uses Dash Hudson's AI technology to build a data-driven content strategy. Yes, it's possible—and powerful in today's saturated social world.

"We've seen a big increase in engagement using Dash Hudson. The user interface makes it so easy to judge why you had a great week, and how you can repeat that success. It also reveals what those moments were that lead you to such an incredible engagement rate. It makes it so easy to take the learnings and put them into action."

Mariah
Former Global Social Media Manager at Cotton On

Fox,

Predicting Content Performance

Dash Hudson's visual intelligence technology, Vision, collects and analyzes all of a brand's photos from social and from within its own content management system. Vision is then able to see what items, colors and visual elements are actually inside an image — not unlike how the human eye sees a photo. It then determines, based on a brand's recent performance, what types of photos its consumers care about most. This means that brands can know if a photo — be it a product shot or fresh from a photo shoot — will perform before it's posted or used in a campaign.

"Vision is changing the way we do things in head office. We now say that if Vision says it's not going to perform highly, we're not posting it."

Mariah Fox,
Former Global Social Media Manager at Cotton On

Create Better Content in Real Time

The accuracy of Vision's predictions for Cotton On have been so on point, that the social team uses the visual cues to guide the creative team in their creation of new content. Each time the brand shoots a campaign, the team uploads the images into Dash Hudson to see Vision predictions in real time. In this way, the team can make adjustments to their shooting style to align with the tastes of their audience on social. Before implementing Vision feedback, about 15% of the images Cotton On posted from campaign shoots performed above the brand's average engagement rate. After bringing the technology on set, 70–90% of photos created were above average performers. This means the team saved time and money on set, while curating a trove of high quality content to use on Instagram.

"We ran all of our assets through Vision, and saw that it really rated influencer visuals higher. While this is something we felt to be true, when the data clearly tells you something, you can't argue with it."

Mariah Fox,
Former Global Social Media Manager at Cotton On

The (New) Cotton On Way

Embracing new technology has enabled the team at Cotton On to take a data-driven approach to their creative and drive performance across channels. They're now able to better engage their audience by serving them up more of what they love. Multiple teams at Cotton On are now using Dash Hudson to create their own channel strategies, and the social team has become a hub for brand assets and innovation within the organization.

What We Can Learn From Cotton On's Strategy

Embracing the Role of AI in Content Performance

Cotton On's challenge was to stand out among the immense volume of content on Instagram. They wanted to ensure their images not only looked great but also resonated with their audience. Vision thorough analysis and performance prediction helps the brand do that.

Influencer Content and Earned Media Strategy

Vision also aids Cotton On in selecting influencer imagery that aligns with their audience's preferences, ensuring that their owned, earned and influencer content consistently engages their audience. The technology has become integral to Cotton On's social media strategy, influencing decisions on what content to post.

Extending AI Insights Beyond Social Media

The insights Cotton On has gained from Vision have spilled over into other marketing areas, like email campaigns. The brand now predominantly uses Vision-approved influencer images in their email marketing, leading to higher click-throughs and conversions.

99. [South Africa to adopt AI](#)

Artificial Intelligence adoption in South Africa is considered low, as experts suggest that large organisations are not AI-ready. However, there is little evidence to prove these sentiments. The research explained the current AI adoption criteria of four large organisations in South Africa from different industries and compared the differences. This explanatory study followed an interpretive philosophy with an inductive approach to explain the AI adoption process of organisations through semi-structured interviews. The findings revealed that organisations are AI-ready, and the low adoption is mainly because AI use cases have not been evident. Organisations view AI as a tool to enable the business to solve business problems and in return create business value. The findings provide an explanation of the decision criteria used by large South African organisations for adopting AI.

100. [AI in game development](#)

You can train artificial intelligence to create the words, visuals, and even narrative of a game.

But can you train A.I. to elicit the fun a great game offers?

Five leading technologists working at the intersection of interactive games and A.I. convened at the Game Developers Conference in San Francisco last month to discuss the effect—good and

bad—of tools like GPT-4 and Midjourney on game development. The panel included Mark DeLoura of Level Up Games, Pete Wurman of Sony AI America, Danny Lange of Unity, and Paul Stephanouk and Steve Collins of [Candy Crush](#) maker King.

Their conclusion? The use of AI in making games is mostly a good thing—though like any tool, the trick is where to best use it.

"It's very much [about] looking at our organization and figuring out how to adopt AI," said Collins, King's chief technology officer, in introductory remarks. King invested heavily in the area by acquiring Sweden-based Peltarion in 2022, he said, and now employs more than 50 people dedicated to machine learning at scale. "Where can we automate decision points in a way that we think of the holistic success of the player over time?"

A particular challenge, the experts agreed, is how fast AI is evolving. "The tools we're using today are erupting with features," said Stephanouk, and the use cases of a popular tool like ChatGPT are exploding. As the head of creative for the popular franchise [Candy Crush](#), Stephanouk said his team is "using these [AI] tools as interactive prompts" as part of the creative process. "We're already seeing ideation processes that leverage these tools," he said.

Lange sympathized. "It's at full speed, everywhere," he said, noting that game developers were using generative AI for the creation of graphics, textures, narrative storylines, and more. "It's really gonna change everything on the creative side."

And that's where things get exciting for players. Wurman, who's working on "Gran Turismo Sophy," a racing AI agent for the long-running automotive game series, said game-makers will no longer have to "cheat" to make robot drivers more realistic to race against. "Having a race that feels like you're racing other human drivers? It's really going to change the way these kinds of games are made," he said.

The panel had differing views on where AI would make the most impact in game development. Wurman cited "repeated, low-level work" as the place where AI could help out the most. DeLoura took a more democratic tack: "They're tools that are way more available to everybody," making it more possible for the average high school student to make an engaging game. Lange was excited about "feedback loops" to make good technology even better; Stephanouk was excited about the ability to relate visual criteria to language criteria.

"I almost said the word game-changer," he said, laughing. "Ugh. But it is."

And let's not forget narrative. "Wouldn't it be great to use generative AI to create lore and quests for a player who takes the road less traveled and moves into areas of the game that were not as refined?" DeLoura asked.

Of course AI in games comes with the same concerns as AI everywhere else, and the assembled experts didn't shy away from addressing concerns about training bias and ethically sourced datasets. Wurman cited a science-fiction magazine that had to shut down its story submission process because of a rash of entries by ChatGPT. "If these tools become really easy, people can make games with no effort, low quality, and no artistry in it," he said. "That can become a very noisy environment for players."

Stephanouk agreed. "This is going to commoditize some types of development," he said. "If you think the app store is full of [trash] now, just wait." Still, "authenticity will rise to the top," he said,

as players search for signal in the noise and connect more deeply with the developers who lovingly crafted their favorite game title.

Whatever the future(s) of games and AI, Collins reminded the panel's audience—packed to the gills, with hundreds of conference attendees waiting outside the doors—that the biggest factor was the human in between: "It's not a technical problem, necessarily."

101. [AI in game industry](#)

SEED's GM Uma Jayaram delivered this keynote address at [MIT Technology Review Arabia](#) in December 2021.

The topic: How AI is transforming entertainment and culture and what ethical and aesthetic considerations to consider when using AI in social contexts.

Watch the video below.

102. [Tencent AI policy](#)

Tencent's mission is to enhance the quality of human life through Internet services. Artificial Intelligence (AI) enables us to do this in powerful new ways. Through both fundamental and applied research, we are advancing the state-of-the-art in the field, and applying AI to products and services that can make the benefits of AI accessible to everyone, everywhere.

We apply AI across key areas of our businesses to improve the user experience and support the growth of enterprise partners:

Content: to create more personalized recommendations for users and deliver new experiences

Social: to create more natural, engaging and entertaining interactions between humans and machines

Games: to connect the virtual and real worlds and enhance the gameplay experience

We are also pursuing key applications across industries:

Medical: to assist physicians in the early detection and prevention of disease

Agriculture: to help farmers grow more food using fewer resources

Industrial: to assist companies to upgrade their capabilities through AI

Manufacturing: to help businesses optimize their infrastructure and operations

We believe AI has tremendous potential to improve productivity, increase business agility, enhance customer engagement and accelerate product innovation. We aim to help enterprises achieve digital upgrade by applying advanced technology, a deep understanding of connections and user behavior, and our ecosystem to create AI breakthroughs that can solve business challenges.

Thousands of Tencent researchers work at our offices around the globe. Key research areas include machine learning, natural language processing, computer vision, and speech recognition.

Machine learning research covers machine learning theory, numeric optimization, large scale distributed computing, heterogeneous computing, supervised, unsupervised and reinforcement learning.

Natural language processing research covers semantic analysis, knowledge reasoning, question answering & chat, and machine translation.

Speech recognition research covers speech enhancement, acoustic/language modeling, and text-to-speech.

Computer vision research covers image and video editing, pattern matching, generation, analysis, and understanding, object detection, tracking and recognition, optical character recognition, 3D vision, simultaneous localization, and mapping and vision-based reinforcement learning.

[103 Letter from the president on AI](#)

I would like to begin by wishing everyone a happy New Year.

People's lives took a turn for the better in 2023 thanks to the COVID-19 pandemic largely subsiding, after having raged for so long, and to the lifting of the restrictions it had triggered. At the same time, 2023 was also a year of tumult exemplified by an intensification in geopolitical risks and sharp inflation stemming partly from monetary policy moves made by central banks grappling with the pandemic. Regions, countries, and even we as individuals found ourselves in a time of transition as the world struggled to establish what the "new normal" would look like following the pandemic.

With uncertainty on the rise in society as a whole, change was also underway in the realm of digital entertainment, where we position our core business. In 2023, we saw the release of eye-catching products and services in multiple domains where the commercialization and adoption of emerging technologies had seemed a more distant eventuality. The potential of these offerings also garnered greater attention than ever before.

For example, whereas the extended reality (XR) domain had previously developed primarily around business applications for the metaverse and other virtual spaces, 2023 saw the rise of many new services fusing virtual spaces with the real world. A case in point is the way the architecture sector, which previously had limited integration of XR in its business, began increasingly adopting these technologies because they enable the conversion of real-world architectural structures into data, a process also facilitated by the widespread use of commercial drones. In the realm of digital entertainment, where the focus has been on pioneering the development of new content, the experiential value of digital content itself increased dramatically as devices came to market that

were capable of delivering even more immersive, realistic experiences using virtual reality (VR) and augmented reality (AR). The next step will be applying these technologies to new forms of content that fuse the real and virtual worlds.

Artificial intelligence (AI) and its potential implications had for some time largely been subjects of academic debate. However, the introduction of ChatGPT, which allows anyone to easily produce writing or translations or to engage in text-based dialogue, sparked the rapid spread of generative AIs. Its release made it apparent that the applicability of generative AI was by no means limited to text, and the subsequent months saw a quick succession of launches of new services and content that expanded generative AI into a variety of domains with close ties to digital entertainment, including images, video, and music. I believe that generative AI has the potential not only to reshape what we create, but also to fundamentally change the processes by which we create, including programming.

As such, 2023 was a year of numerous innovations in the realm of digital entertainment. It was also a milestone year for the SQUARE ENIX GROUP in that we both celebrated our 20th anniversary and also set forth on a new path under the management team that I head.

Since assuming the roles of president and representative director of SQUARE ENIX HOLDINGS in June 2023, I have worked to reassess our entire Group. Customers, shareholders, investors, employees, and other stakeholders have generously shared their time and insights on numerous occasions to help me do so. These insights have assisted me in identifying the direction we should take to achieve further growth and in beginning to lay the groundwork to make that a reality.

In our Digital Entertainment business, we are working to strengthen both our content development and publishing capabilities.

On the content development side, we are working not only to vet our existing pipeline of titles under development, but also to put the capabilities in place to ensure that development efforts that have yet to begin result in products and services that meet the expectations of our customers more than ever before. Specifically, we have begun optimizing our resource allocation across our entire development chain in order to accelerate an effort that was already underway to strengthen our internal development capabilities. We are also expanding knowledge sharing with the goal of standardizing our processes and enhancing our efficiency.

On the publishing side, which consists of our sales and marketing functions, we are working to enable greater global collaboration and to promote the shift to digital. By sharing information within our Group on the features unique to different geographical markets and on the best practices for addressing them, we are bolstering our publishing capabilities globally. We see this as an effective means not only to maximize our sales of new titles, but also to deliver our rich back

catalog to more customers and in turn to expand the fan base for our Group's intellectual properties (IPs).

We are also working to put organizational structures in place that will enable closer collaboration between our content development and publishing functions. Our goal is to strike a balance between a product-oriented and a market-oriented approach so that we are able to share customer views with our content development team and thereby create content that makes our customers even happier than ever before.

We also intend to be aggressive in applying AI and other cutting-edge technologies to both our content development and our publishing functions. In the short term, our goal will be to enhance our development productivity and achieve greater sophistication in our marketing efforts. In the longer term, we hope to leverage those technologies to create new forms of content for consumers, as we believe that technological innovation represents business opportunities.

With a focus on comics, our Publication business provides content spanning a wide range of genres in both digital and printed formats. Our Amusement business meanwhile provides real-world entertainment, primarily through its TAITO STATION amusement facilities. Both businesses enable us to reach broad customer segments beyond those that engage with our Digital Entertainment business, thus bolstering awareness of our Group. They help us to convey the appeal of our content in a more multidimensional way, which I see as vital. These businesses naturally have potential synergies with our Digital Entertainment and other businesses, and they also play a role in our multifaceted approach to leveraging our IP, including via film and animation adaptations. As such, I see them as capable of contributing to our Group's growth and intend to continue to focus on them.

In terms of new business domains, we previously identified three focus investment fields, namely blockchain entertainment/Web 3.0, AI, and the cloud. Last year we redefined our overarching mission and goals for these three fields. We are currently working to modify our organizational structure and optimize our resource allocations to support these efforts.

In addition to our focus investment fields, we will also endeavor to create mechanisms that enable us to diversify our earnings sources. These initiatives will be the most important determinants of our Group's ability to adapt flexibly to a changing business environment and to continue to create high-quality content. They will also help us create an environment that allows each and every one of our employees to demonstrate the full measure of their individuality and creativity.

Many of the initiatives that were undertaken in 2023 were designed to bring the whole of our Group together to create content that truly satisfies our customers and to establish the capabilities to deliver that content to as many customers as possible.

2024 will mark the starting point for our Group to achieve additional strides forward and further growth. We will articulate our new corporate strategy in the form of a Grand Design and devote ourselves to executing each of our initiatives. Never fearing change and always maintaining a challenger's mindset, we will work together as one to drive our businesses forward.

I wish you all the very best for the new year.

104. [Ghostwriter using AI in script writing](#)

As games grow bigger in scope, writers are facing the ratcheting challenge of keeping NPCs individually interesting and realistic. How do you keep each interaction with them - especially if there are hundreds of them - distinct? This is where Ghostwriter, an in-house AI tool created by Ubisoft's R&D department, La Forge, comes in.

Ghostwriter isn't replacing the video game writer, but instead, alleviating one of the video game writer's most laborious tasks: writing barks. Ghostwriter effectively generates first drafts of barks - phrases or sounds made by NPCs during a triggered event - which gives scriptwriters more time to polish the narrative elsewhere. Ben Swanson, R&D Scientist at La Forge Montreal, is the creator of Ghostwriter, and remembers the early seeds of it ahead of his presentation of the tech at GDC this year.

The Beginnings of Ghostwriter

Ben's interest in creative applications of Natural Language Processing began while studying his PhD in Computer Science at Brown University, where he took a class with two creative writers from Brown and Rhode Island School of Design on Digital Literature. In this class, Ben was introduced to the idea of creating art using generative models and has since been exploring the possibilities of combining this technology and creative writing. This interest followed him to Google where he worked at Stadia Games and Entertainment in 2019, and then Latitude at AIDungeon, where he furthered his research in machine learning and [published a paper](#) on the subject in 2021.

In 2021, Ben became interested in joining Ubisoft, as he was intrigued by a GDC talk from the Watch Dogs team. "I actually saw a [talk](#) on the narrative design of Watch Dogs: Legion, and I was very impressed," he explains. "I thought to myself, 'I wish I was working on something like that with teams of professional scriptwriters,' so, I applied."

This fortuitous timing allowed Ben to connect with Ubisoft La Forge who had already been scoping for a solution to some of their technological questions. "It was perfect timing because they wanted someone to do exactly what I wanted to do."

Ben's wish to work with professional and like-minded teams became a reality as he began collaborating with members of the La Forge team in China, whose expertise in UX/UI and web application development resulted in a now operational tool: Ghostwriter.

Ghost of AI Present

Ghostwriter is the result of conversations with narrative designers who revealed a challenge, one that Ben identified could be solved with an AI tool. Crowd chatter and barks are central features of player immersion in games - NPCs speaking to each other, enemy dialogue during combat, or an exchange triggered when entering an area all provide a more realistic world experience and make the player feel like the game around them exists outside of their actions. However, both require time and creative effort from scriptwriters that could be spent on other core plot items. Ghostwriter frees up that time, but still allows the scriptwriters a degree of creative control.

"Rather than writing first draft versions themselves, Ghostwriter lets scriptwriters select and polish the samples generated," Ben explains. This way, the tech is a tool used by the teams to support them in their creative journey, with every interaction and feedback originating from the members who use it.

As a summary of its process, scriptwriters first create a character and a type of interaction or utterance they would like to generate. Ghostwriter then proposes a select number of variations which the scriptwriter can then choose and edit freely to fit their needs. This process uses pairwise comparison as a method of evaluation and improvement. This means that, for each variation generated, Ghostwriter provides two choices which will be compared and chosen by the scriptwriter. Once one is selected, the tool learns from the preferred choice and, after thousands of selections made by humans, it becomes more effective and accurate.

Challenges and Global Support

Teaming up with Ubisoft La Forge with this state-of-the-art tech did not come without challenges. AI in video games is not a new concept, with most associating this technology with NPC behaviors. Yet, this concept of machine learning is restrictive to its actual implications, as the industry now sees a place and need for not just AI tools, but machines that can learn through human feedback. Ben's research and work on Ghostwriter and his collaborations with teams across the globe have resulted in an AI infrastructure at Ubisoft that takes into account this potential, while working hand-in-hand with narrative designers to help kickstart their creative stories and games.

However, working with like-minded teams and getting the tool from conception to Ubisoft was only half the battle, as Ben says the focus has now shifted to supporting adoption by productions. By collaborating closely with scriptwriters, the team can learn their needs in order to better fit the tool into the unique worlds of each game. A tech like Ghostwriter requires scriptwriters to learn how to not only use the tool, but also integrate it in their video game production process.

The team's ambition is to give this AI power to narrative designers, who will be able to eventually create their own AI system themselves, tailored to their own design needs. To do this, they created a user-friendly back-end tool website called Ernestine, which allows anyone to create their own machine learning models used in Ghostwriter. Their hope is that teams consider Ghostwriter before

they start their narrative process and create their models with a vision in mind, effectively making the tech an integral part of the production pipeline.

Future of Ghostwriter

Ben is very optimistic about Ghostwriter's later implementation in video games and believes in its role in the future of our games. Through its user-friendly interface and processes and its powerful AI infrastructure, scriptwriters who decide to include the tech in their production will eventually be able to scale up their games, be more ambitious in their narrative designs, all while having full control over their work.

105. [Supercell AI fund venture](#)

[Twitter](#) and top executives from [Google](#) and video game company [Supercell](#) are among those backing a London venture capitalist's new fund dedicated to investing in early stage startups with artificial intelligence at the heart of their business models.

[Air Street Capital](#), a boutique venture capital company founded and run by Nathan Benaich, said Friday that it had closed a new \$17 million fund.

Benaich, Air Street's founder and sole general partner, is a veteran early-stage investor who has previously worked for venture firm Playfair, in London, and Berlin's Point Nine Capital. He was a seed investor in Mapillary, a Swedish company that collected street-level imagery to build highly detailed digital maps, which was [acquired by Facebook](#) in June for an undisclosed amount.

Benaich has a Ph.D. from the University of Cambridge in using advanced computational methods, including machine learning, in cancer research. He is well known in U.S. and European technology circles for cofounding two annual conferences that bring together academic machine learning researchers with those applying the technology in commercial settings: the Research and Applied Artificial Intelligence Summit (RAAIS) and London.AI. He also coauthors [an annual "State of A.I." report](#) that many consider an important barometer of the technology's adoption and impact.

In addition to [Twitter](#), which is investing in Air Street Capital directly from its own balance sheet, investors in the new fund include, among others: Ilkka Paananen, the billionaire founder and chief executive of Finnish video game company Supercell, maker of the popular game Clash of Clans; Jeff Dean, a senior vice president at Google's research and health divisions; and Shakil Khan, a London investor known for his early backing of Spotify. The European private equity firm Vitruvian Partners is also investing in the new fund.

Air Street invests primarily in what is known in venture capital as [the "seed stage,"](#) when startups are first getting up and running. The new fund will make between 20 and 25 investments, each averaging about \$700,000, Benaich said. The investments will be split about 50/50 between startups in the biomedical industry and those using A.I. in other industry niches.

Benaich told Fortune that the thesis behind his new fund is that more generalist venture capital firms cannot properly assess very early stage artificial intelligence companies, because the business models and metrics for success are new. “The playbook for what ‘great’ looks like in this category of companies is still being written as we speak,” he said.

He also said that many venture capital firms, which invested in a wide range of different sorts of technology companies, did not fully understand the cutting edge of A.I. technology and what kinds of businesses these new methods enable. “Generalism for technical fields like machine learning is dead,” he said.

He described Air Street’s job as finding A.I. startups—in some cases talking to academic researchers when they are just beginning to think about becoming entrepreneurs—and nurturing these very young startups until they are mature enough to start to resemble a traditional software as a service (SaaS) or enterprise software or biotech company. These companies will then “graduate” on to larger venture capital investors who specialize in those kinds of business models.

Although Benaich is Air Street’s sole general partner, he has recruited several entrepreneurs who have previously built successful A.I.-enabled businesses to serve as “operational partners,” or advisers to the fund’s startups. These include Luc Vincent, an executive vice president at ride-hailing company Lyft who leads its self-driving initiatives, and Phil Keslin, a Google alum who is a cofounder and chief technology officer at Niantic, the company that created Pokémon Go.

Ryan McDermott, the managing partner of San Francisco–based Resolute Partners Group, an asset manager that invests money for several prominent entrepreneurs in the computer gaming industry, told Fortune he had put money into Air Street Capital’s new fund because he concurred with Benaich’s views on the impact A.I. will have on certain industries, particularly in life sciences.

“We are seeing the complete re-creation of how we see therapies coming to market and the speed and the novelty of those drugs,” McDermott said.

But he also praised Benaich’s connections among A.I. company founders and his sharp eye for spotting emerging trends in the field. “He has got this amazing network, and he is going to be the go-to guy for a lot of people,” McDermott said.

Air Street Capital has already made eight investments from the new fund, Benaich said. These include [LabGenius](#), a London company using robotics and machine learning to discover new drugs; Mission Barns, a San Francisco company that, similar to Memphis Meats, is growing meat in cell cultures; and Allcyte, an Austrian startup that is using machine learning to predict how blood cancer patients will respond to certain therapies based on analysis of images of their cells. It also has a stake in [Graphcore](#), a U.K. company creating computer chips that are specifically designed for artificial intelligence.

106. [AI trust and safety](#)

At Wildlife, we make player safety a top priority. Our Trust and Safety team is dedicated to protecting our players from harmful behavior. We monitor all in-game user-generated content by using state-of-the-art AI scanning.

Our Trust and Safety team reviews flagged content, including reports sent directly from users and notifications from our AI systems. We take action whenever it is necessary to ensure the safety and well-being of our players.

When the most severe harmful content is detected, we partner with international law enforcement and child protection agencies to report this content.

107. [Globant AI Manifesto](#)

At Globant our mission is to make the world a better place, one step at a time. Leveraging our cross-industry expertise and Artificial Intelligence (AI) knowledge, we aim to reinvent businesses, helping organizations thrive while changing how they impact society.

Our mission

The use of AI is impacting businesses and industries, bringing new challenges, and along with this, a great responsibility. To incorporate AI into the organization, we must unite and embrace a common vision, overcoming ethical challenges and social risks.

Our principles

Globant has defined a set of principles that includes what we believe in, and what we encourage. We invite you to read them, embrace them and share them:

Augmented Intelligence: AI should exist to cooperate with humans and to improve humanity. Collaborating with humans on complex tasks and facilitating their work, relieving them from tedious tasks and elevating them.

Respectful Data: A data-driven culture means having clean and accurate data, being compliant with laws and regulations, and guaranteeing the privacy and intimacy of all individuals. Meet strict reliability, security and integrity standards.

Fairness: We will actively promote data-driven outcomes that are unbiased in terms of race, ethnicity, gender, nationality, income, sexual orientation, ability, and political or religious belief. We can't expect to always have an unbiased history, so the way we use the results needs to take the fairness of the application into consideration as well.

Transparency: Create transparent products in their purposes and results. We are committed to pursuing algorithmic accountability. AI products must preempt the risks of user data misuse and protect from imprudent use. Must exercise caution by anticipating adverse consequences. Limitations and risks should be explicit, enabling policymakers to hedge for critical cases.

Social Contribution: Ensure access to relevant forms of knowledge, promoting fundamental skills and critical thinking among the community. Open, promote and make AI research more accessible to the community.

Sustainable AI: The way to frame the problems to solve, the usage of foundational models, training strategy and other factors need to consider how to minimize the ecological and human detrimental impact. Reduce the impact of large energy consumption on model training and serving, while improving digital sobriety and minimizing addictive behaviors.

What we will not support

We will not pursue any AI applications which contravene or may contravene any law or regulation, the public order and good morals, which includes, among any others:

Misinformation: We will not collaborate on AI systems developed to spread untrustworthy information, misinformation or disinformation. While those categories may seem contentious, appropriate sourcing of information and proper alignment of objectives can dampen unfortunate impacts.

Malicious Use: The same algorithm can be used in different contexts and ways. The dissemination or misuse of algorithms threatens people's capacity to trust in the use of algorithms and their legitimacy.

Taboo Exploitation: We must be conscious of the misuse of sensitive characteristics such as race, ethnicity, gender, nationality, income, sexual orientation, ability, and political or religious belief. These characteristics may be leveraged for a fairer approach to AI, but their sole consideration poses concerns that need to be addressed.

Reckless AI: Implementations that may cause or directly facilitate injury to people. Good intentions without proper consideration can cause increased damage.

Law Contradiction: Projects that contravene widely accepted principles of international law and human rights, such as data protection, Information security and others.

108. [AI in Wargaming](#)

This report presents findings from CETaS research undertaken on behalf of the Dstl-sponsored AI Research Centre for Defence (ARC-D), examining the potential for the application of artificial intelligence (AI) and automation in wargaming. The research focused specifically on segments of manual analytic wargames with partially simulated elements and aimed to identify ways that AI could 1) increase the efficiency of preparing and implementing a game, 2) support player decision-making and 3) improve the insights that can be gained through wargames.

Given advances in non-defence AI, and game AI in particular, there is growing interest in leveraging AI for wargaming and simulation. The envisaged benefits are specific to the context of use, but examples include reducing the number of personnel required, increasing the speed of development of game mechanics, improving player immersion, speeding up game execution, and identifying innovative strategies and actions.

The research identified two key features of the current landscape of AI-enabled wargaming that make it harder for decision-makers to determine whether AI can in fact achieve these benefits: 1) This is a nascent debate, which has been heavily influenced by AI hype. While many ideas are circulating on how AI could improve wargaming workflows, few real-world case studies offer concrete evidence of effectiveness. And 2) AI-enabled wargaming is a subject that prompts highly varied opinions between subject matter experts. Much disagreement can be attributed to differences in expertise and experience, for example between wargamers and experts in modelling and simulation, or between technical experts and strategic decision-makers.

Within this context, this report aims to advance the debate by taking an evidence-based approach to assessing the feasibility of specific AI use cases for wargaming, outlining both their risks and potential benefits. Beyond specific AI applications, this report explores two possible investment pathways for AI in wargaming: 1) narrow, specialised AI applications for the near-term, and 2) high-risk, high-reward AI investments. We conclude that the benefits AI can bring to wargaming could be significant, but there would be benefit in first introducing automation in specifically tactical or abductive wargames in the near term to manage risks. While some narrower applications of AI can be deployed in the near-term, the most ambitious and transformative applications require further research and investment. Similarly, further investment in cross-cutting enablers is required before AI can be introduced effectively into strategic-level wargames.

[109. Future production with AI](#)

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With KUKA into the future of Industrie 4.0

What does the future of Industrie 4.0 hold? One thing is certain: it has already begun. Artificial intelligence is making its way into production. Machines are starting to learn independently and to make production more efficient by themselves. And the physical and digital worlds are merging more and more.

Industrie 4.0: A glance into the future

The term Industrie 4.0 has been around for several years. And the corresponding technologies – for example the Internet of Things, cloud computing or artificial intelligence (AI) – were not invented just yesterday. Nevertheless, significant technical advances are being made almost daily. Three trends stand out in particular.

Artificial intelligence (AI) is already one of the driving forces of digital transformation – and will become even more so in the future. AI is making the predictive maintenance of machines possible,

for example. And robots deployed in the smart factory are transforming into autonomous assistants that can learn independently, act logically and communicate with each other.

Likewise, machine learning is making its way into the factory as one of the most important areas of AI for KUKA and will soon become an integral part of the smart factory. Learning machines can “understand” the patterns and cause-and-effect relationships that they generate themselves. They “learn” and react in real time by independently refining their algorithms.

No less revolutionary is the principle of mixed reality. It combines the technologies of virtual reality (VR) and augmented reality (AR). Virtual reality means that the user is completely cut off from the real world and is in a virtual environment that can be viewed through glasses. In augmented reality, on the other hand, the real environment remains visible but is overlaid with digital content (virtual objects, information). The technology of mixed reality now allows virtual content to be combined with the real world. In contrast to augmented reality, content in mixed reality is not simply projected, but appears as a hologram realistically integrated into the physical world by means of mobile devices or head-mounted displays, such as the Microsoft HoloLens. This hologram can be moved and modified as if it were a real object.

The future has thus already begun. But what practical use do these technologies have in industry? Take a look at some of KUKA’s innovation projects.

Mixed Reality Interface: data within easy reach

In our [Mixed Reality Interface pilot project](#) we are breaking new ground in human-robot interaction: using a head-mounted display (e.g. Microsoft HoloLens) or an app on a tablet or smartphone, users can see data regarding the robot’s protective space and workspace as well as the robot path directly at the cell and thus intervene to adapt the programming accordingly. This makes commissioning tasks much more intuitive and user-friendly.

KUKA.Sim: smart simulation software for KUKA robots

With our simulation software KUKA.Sim, robots can be programmed outside the production environment. The software allows users to interact with a digital twin – an exact virtual replica of the later production process. Whether designing the process or visualizing material flows and bottlenecks or the PLC code: the 3D simulation created by KUKA.Sim covers all planning processes. The virtual and real controllers work with identical data: what is planned virtually will later take place exactly the same way in reality. This ensures maximum planning reliability for the production processes with low effort and costs.

[Find out more about KUKA.Sim.](#)

KIVI: artificial intelligence reduces maintenance effort

If the service life of individual robot components can be predicted, cost-intensive failures and production downtime can be avoided. This is exactly what the research project [“Artificial Intelligence for Lifetime and Availability Prediction of Industrial Robots” \(KIVI\)](#), funded by the Bavarian State Ministry for Economic Affairs, Energy and Technology (StMWi), is addressing. The aim is to continuously monitor the condition of industrial robots and enable predictive maintenance (condition monitoring and predictive maintenance). For this purpose, several sensors first transmit data on the vibration behavior of individual robot components in operation. Artificial intelligence is then used to evaluate the data: it identifies patterns in the

emergence of wear conditions, from which it develops behavioral models. The result is a prototype AI toolbox that is now already in the evaluation phase. As soon as it can be deployed commercially, manufacturing companies will be able to increase the availability of their systems and make the production process more efficient – which, not least, will also help to conserve resources.

Advantages of monitoring and preventive maintenance through AI

Translearn: robots learn how to learn

The starting point of all optimization processes for industrial robots is data. Producing and collecting data, however, costs a lot of time and money. For reasons of economy, data can also be collected nowadays by simply simulating robot interactions. The problem: even highly advanced simulations cannot yet replicate reality perfectly. The strands of action learned in them cannot be easily transferred to real robots. This difficulty is often referred to as the “reality gap”.

This is exactly where our “TransLearn” project comes in: We want to overcome the reality gap by identifying errors in the simulation. The goal is to seamlessly transfer the simulation results to real robots.

This brings many advantages: in simulation, robots can be programmed faster and better, which reduces programming costs. In addition, robots can learn better and more independently if this happens both in simulation and in the real [system](#). Thanks to such an optimized learning process, industrial robots will no longer need to be programmed at all in the future, but only instructed. In this way, they can also learn independently how to shorten their cycle times or consume less power.

OPERA: controlling robots more precisely.

With OPERA, users can see the probable motion sequences of their cobots. Collaborative robots, so-called [cobots](#), learn by the user manually guiding them through the desired motion sequences. This is therefore also referred to as hand-guided programming. It makes a lot of things easier, especially for small and medium-sized companies. Despite the intuitive handling, however, the process still requires some finesse in terms of exactness and error tolerances, which means that an expert still has to be involved in the programming.

This is exactly where the OPERA project comes in: since not all sources of error in cobots can be identified deterministically, we have developed probabilistic models. Users can now very easily see in a 3D model where inaccuracies occur in the motion sequences of their cobot and react accordingly. They thus benefit from more flexibility and accuracy and greater system stability.

[Find out more about the OPERA project.](#)

With OPERA, users can see the probable motion sequences of their cobots.

VWS4LS: a digital twin advances automation

The wiring harness (also “wiring assembly” or “on-board electrical system”) is one of the most elaborate and complex individual components of an automobile. This is because there are as many individual wiring harnesses for a new series as there are equipment variants: hundreds of thousands. As such one-off products, wiring harnesses are correspondingly expensive to manufacture. Together with other partners, we are therefore working on the implementation of an “Asset Administration Shell for the Wiring Harness” (VWS4LS). Based on the “Asset Administration Shell” technology, digital information on each wiring harness is supplemented in

this project in such a way that an interoperable digital twin can be created for the development, production and assembly of the wiring harness in the automobile.

KUKA is focusing on the creation of product and process descriptions and on deriving the robot motions required for the respective production sequence from the corresponding information in the asset administration shells.

Find out more about the VWS4LS project.

BaSys 4.2: making manufacturing processes more flexible

Companies with state-of-the-art production processes must be able to react quickly to variable demand or changing conditions. The production process in particular therefore frequently requires adjustments – to the process itself, to the production resources, but also to the product to be manufactured. This kind of “continuous engineering” should therefore be possible at all times. With BaSys 4, a basic system for production systems has already been developed that makes production processes efficiently adaptable. With the BaSys 4.2 project funded by the German Federal Ministry of Education and Research (BMBF), we are now working on implementing further Industrie 4.0 infrastructure elements based on the concepts and standards of the Plattform Industrie 4.0. We are focusing on the three topics “Middleware”, “Capabilities” and “Virtualization”. By doing so, we aim to advance standardized capability models and realize their use in automated capability checks.

The goal is versatile production systems that can react intelligently and transparently to changing requirements.

110. [The New York Times is building a team to explore AI in the newsroom](#)

The New York Times will begin building a team to explore the use of generative AI in its newsroom. Zach Seward, who was recently [hired by the publication](#) to head AI initiatives, [posted on Threads](#) that the team will be “focused on prototyping uses of generative AI and other machine-learning techniques to help with reporting and how the Times is presented to readers.”

Seward’s post said the Times plans to hire a machine learning engineer, a software engineer, a designer, and a couple of editors to round out the AI newsroom initiative. So far, the Times has posted job listings for an associate editorial director for AI initiatives and a senior design editor.

“The team, led by the editorial director for A.I. initiatives, will also include colleagues with a mix of engineering, research, and design talent, acting as a kind of skunkworks team within the newsroom. Together, they will partner with other teams in the news, product, and technology groups to take the best ideas from prototype to production,” the [listing for associate editorial director, AI initiatives](#), reads in part.

In [a memo posted after Seward’s hiring](#), the Times said that while it’s excited to bring AI tools to the company, it is firm in its belief that “Times journalism will always be reported, written and edited by our expert journalists.”

The Times has had a rocky relationship with generative AI. It was one of the first news organizations that [blocked OpenAI’s web crawler](#) from scraping its content. That then snowballed

into [its lawsuit against the AI company](#) and Microsoft, OpenAI's biggest investor, alleging that ChatGPT reproduces its articles word for word and that it undermines the publication's relationship with readers and deprives it of revenue. It is unclear whether the Times will partner with an AI model provider or build its own tools.

Many news organizations have begun exploring how (and whether) to bring AI, both generative and "traditional" machine learning, to newsrooms. Axel Springer, publisher of Politico and Business Insider, [inked a deal with OpenAI](#) to share content with the AI company and explore how to use AI in its reporting. The Associated Press also [signed a similar agreement](#).

Of course, it's always tricky melding AI and newsrooms. So far, it has brought a [proliferation of fake news](#) and stories written by AI with [fake human bylines](#). This experiment, though, might be different. The Times will still have human journalists write the news.

111. [ABC builds its own AI model](#)

The ABC is working on its own large language model – a type of artificial intelligence trained on vast amounts of data – to “enhance” its work, while also warning staff against using AI platforms like ChatGPT or Midjourney to create content for news.

In an internal email sent to ABC staff last month, Matt Brown, the ABC's news standards editor, said the public broadcaster was piloting AI technology in its news teams and developing its own.

112. [JoongAng Group Builds South Korea's First AI-Driven Enterprise Network by Juniper](#)

With South Korea's first AI-driven enterprise network by Juniper, JoongAng Group can continue to lead its diverse array of business and broadcasting services, while securely maximizing operational efficiency and flexibility for future business expansion.

CHALLENGE

The company has a wide range of businesses and is active across the newspaper, broadcasting, digital content, entertainment, and leisure sectors. Since 2008, JoongAng Group has been listed under the KOSPI stock index, which is reserved for large companies in Korea, establishing the company as a domestic powerhouse.

Upon completion of its flagship JTBC Building in 2019, the company started preparations to spread its workforce across two office buildings. In a time where enterprise networking environments were rapidly shifting from a mix of wired and wireless to completely wireless, JoongAng Group understood the need to introduce a next-generation network system that would provide a unified experience for all employees in both buildings.

JoongAng Group based its infrastructure on a smart office concept centered on a fast, seamless wireless network that would bridge the two buildings. If the buildings' networks were not perfectly

integrated, however, employees would have to go through cumbersome procedures, including configuring their IP settings and authenticating repeatedly, inevitably disrupting their workflow.

The decision to go completely wireless reduced the spatial complexities caused by wired networks, including cables and power sources, enabling employees to excel at their work from any location in either building. The smart office environment enhanced by wireless network technology has become essential to media employees who often have meetings outside their offices.

SOLUTION

Juniper Networks wired and wireless network solutions fulfilled all of the company's needs and were first deployed in the JTBC Building last year, followed by the JoongAng Building. "With a Juniper-powered network that offers AI-driven proactive automation and self-healing capabilities, JoongAng Group will be able to provide a secure work environment with a focus on uninterrupted workflows for all of our employees," says Young Ki Kim, director, JOINS JoongAng.

Juniper AP41 and AP43 High Performance Access Points have been deployed in conjunction with the Juniper Mist Wi-Fi Assurance cloud service to simplify network operations and automate the support experience for the distributed workforce. In particular, Juniper Access Points, equipped with Wi-Fi 6, stood out for providing enterprise-grade performance and an AI engine that has replaced manual IT tasks with AI-driven proactive automation and self-healing.

Juniper's EX9200 line of Ethernet Switches and EX3400 Ethernet Switch were also selected to enable collaboration and provide simple and secure access for the delivery of mission-critical applications—crucial for executing the company's smart office concept. The two buildings' networks were completely integrated in 2020, resulting in exceptional user and device experiences. JoongAng Group has now built South Korea's first AI-Driven Enterprise network by Juniper.

OUTCOME

With Mist AI driving its network, JoongAng Group has leapt ahead of the industry in terms of network efficiency, leveraging automation and insights to lower IT costs while maximizing the end-user experience. "Because the two buildings are located next to each other on the same block, employees can move freely from one building to another, if needed," Young says. "About 10% of our workforce frequently use both buildings. If they had to spend time configuring the network for each building, work efficiency would inevitably decrease. With Juniper Mist, our employees can spend their valuable time doing the work that they need to do."

As part of its smart office concept, JoongAng Group continues to explore more ways to leverage Juniper's AI-driven solutions to transform the employee experience in a digital workplace. At the same time, it will continue to refine its security and emergency response system for employees and guests, especially against the backdrop of the ongoing pandemic.

JoongAng Group is now considering extending its use of Juniper's AI-driven solutions to all of its affiliates in the near future. In addition to its media division, it has various businesses that would greatly benefit from wireless networks for customer service such as its leisure and movie theater businesses.

113. [Panel Discussion Artificial Intelligence and Democracy](#)

The time has come to “democratize” AI

Yascha Mounk

While artificial intelligence (AI) might bring about technological innovation to help solve issues such as climate change, it also poses problems that could shake the foundation of democracy, such as unemployment, educational gaps, and the control of information. What does it take to make AI truly meaningful for democracy? With Managing Director Yoichi Nishimura of The Asahi Shimbun serving as coordinator, prominent US and Japanese researchers exchanged opinions about this question.

Associate Professor Yascha Mounk at Johns Hopkins University defined populists as dangerous people who think, “I alone truly represent the people and those who have opinions and values different from mine are bad and dangerous,” listing US President Trump, Brazilian President Bolsonaro, and Prime Minister Modi of India as examples. He also pointed out that these political leaders were attacking the democratic systems and organizations designed to restrict their powers, such as judicial systems, thereby damaging core values that must be protected, such as individual freedom.

Cathy O’Neil

Cathy O’Neil, who is a data scientist and mathematician, pointed out the problems regarding widely utilized AI algorithms, saying, “Algorithms make mistakes with respect to important decisions to be made on the behalf of general citizens and yet are inaccessible to those citizens.”

According to Ms. O’Neil, US company Amazon had planned to use AI to hire employees, but in an internal test of the system, it was revealed that without being programmed to the algorithm gave men a higher rating than women. She pointed out that algorithms are not founded on a factual basis but reflect subjective ideas and opinions that are incorporated into the data and so should not be trusted.

Noriko Arai

Professor Noriko Arai, Director of the Research Center for Community Knowledge, raised an issue regarding digitalization, through which a small number of IT giants, such as GAFAs, monopolize profits. “It cannot be a sustainable system,” she observed. “The anger of those left in poverty will fuel populism. We need to think about this issue from legal, economic and ethical viewpoints.”

The panelists also talked about how the expanding gap between rich and poor is related to populism. Ms. O’Neil said that she at one time developed algorithms to provide only those who were doing a lot of buying online with diverse options. She criticized these algorithms, which gave no options to those who were not frequent users of the Internet or to poor people, saying that they were “creating inequalities.” Regarding the possibility that the growing gap between rich and poor could lead to populism, she said, “I don’t think it is impossible to prevent, but in order to prevent it from happening we need algorithms that are accountable,” and pointed out the need to have laws to regulate the current systems.

Associate Professor Mounk said that elites have been accepting of democracy because the system provided them with gains and that whether AI was changing the situation or not should be carefully monitored. He expressed his concerns about the possibility that AI would replace workers and, as a result, elites would no longer need the middle class, eliminating even the need to redistribute wealth and educate citizens.

The panelists also referred to movements in China, where digital technologies were being utilized for the control of society and economic growth. According to Ms. O’Neil, China is using surveillance technology for social control. “It scares me a lot,” she said, but also pointed out that AI was becoming a tool to control society in the United States as well, although it was politically untouchable because politicians were beneficiaries.

Professor Arai said that using AI to control society was not something happening only in China and that that was exactly what was being tried in Silicon Valley, but that GAFA had the arrogance to think that they could use AI in appropriate ways.

The audience raised questions about what citizens could do in response to this issue. Professor Arai answered that people should stop readily believing whatever numerical figures they are shown. “In order to survive in this knowledge-based society, citizens need to have numerical literacy so that they are not afraid of numbers. I am focusing on educating children to help them acquire that literacy.” Ms. O’Neil emphasized a related point, saying, “But we don’t need to understand mathematics to object to a system. We need to question the system and demand our rights.” Associate Professor Mounk pointed out the need to call for the revision of tax-related laws to prevent tax evasion, in addition to demanding rights. He also said that it was necessary to think about how to protect democracy, which was still in the hands of the people.

Managing Director Nishimura, who served as coordinator for the discussion, concluded with the following words: “AI could deliver great opportunities to us if we use it correctly. However, there are so many issues regarding algorithms and big data. We gave this panel discussion the title “AI and Democracy,” but maybe we need to think about “democratizing AI and data.”

Yascha Mounk: Specializes in international politics. Young and energetic political scientist born in Munich, Germany in 1982. Associate professor at Johns Hopkins University. He also teaches at Harvard University. Proactively shares information via Twitter and podcasts. His writings include *The People versus Democracy*.

Cathy O’Neil: Data scientist and mathematician. Born in 1972. After working at a hedge fund, founded an algorithm auditing firm in 2016. Her writings include *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*.

Noriko Arai: Professor and mathematician, Director of Research Center for Community Knowledge, National Institute of Informatics. Engaged in a project to develop an AI robot that can pass the entrance examination for the University of Tokyo. She insists on the importance of helping junior and senior high school students to improve their ability to read and understand rather than calculate and memorize. Her writings include *AI-ni Makenai Kodomo-wo Sodateru (Raising Children Who Will Not Give In to AI): 21 Century Children*.

114. [BBC AI Principles](#)

Our BBC AI Principles are at the heart of our approach to using AI responsibly and apply to all use of AI at the BBC. They underpin the BBC's public commitments about how we will use Generative AI.

We will act in the best interests of the public

BBC Values: Our use of AI will reflect the public service mission and values of our organisation: upholding trust; respect and inclusivity; boosting creativity; putting audiences at the heart of everything we do; being accountable and delivering quality; and working as one BBC.

BBC Editorial Values: When we use AI to create, present or distribute content we will make sure that this complies with the BBC's editorial values, guidance and guidelines.

Fairness: Our use of AI will be fair, equitable and inclusive for our audiences and staff. We will make sure that everyone has the opportunity to access and benefit from the range of content and services we provide and use.

Security & Robustness: We will use AI in a way that is secure, robust and safe. We will assess its accuracy and reliability, monitor its performance, document its use, and maintain continuity of service.

We will prioritise talent and creativity

Respecting Rights: Creators, contributors and suppliers play a vital role in our industry. We will consider the rights of creators, artists, contributors and rights holders when using AI. We will make sure our use of AI respects the data protection and privacy rights of individuals.

Human Creativity: We will use AI to support and empower human insight, talent and creativity.

We will be open and transparent

Transparency & Clear Explanations: We will be clear with audiences and staff about where we use AI and what data we collect. We will make sure they can understand why we use it, how it works and how it affects them.

Accountability: We will make sure that there is proper supervision of and clear accountability for our use of AI, including our use of content or services provided by others that involve AI.

Human Oversight: Our use of AI will be accompanied by effective and informed human oversight, including over the content or data involved as inputs and outputs.

115. [Reuter AI ethics and principles](#)

Thomson Reuters will adopt the following Data and AI Ethics Principles to promote trustworthiness in our continuous design, development, and deployment of artificial intelligence ("AI") and our use of data:

That Thomson Reuters use of data and AI are informed by our [Trust Principles](#).

That Thomson Reuters will strive to partner with individuals and organizations who share similar ethical approaches to our own regarding the use of data, content, and AI.

That Thomson Reuters will prioritize security and privacy in our use of data and throughout the design, development and deployment of our data and AI products and services.

That Thomson Reuters will strive to maintain meaningful human involvement, and design, develop and deploy AI products and services and use data in a manner that treats people fairly.

That Thomson Reuters aims to use data and to design, develop and deploy AI products and services that are reliable, consistent and empower socially responsible decisions.

That Thomson Reuters will implement and maintain appropriate accountability measures for our use of data and our AI products and services.

That Thomson Reuters will implement practices intended to make the use of data and AI in our products and services understandable.

Thomson Reuters will use employee data to ensure a safe and inclusive work environment and to ensure employee compliance with regulations and company policies.

We believe these Data and AI Ethics Principles will provide our colleagues and partners with the right foundations to build trustworthy, practical, and beneficial AI for our customers. These Data and AI Ethics Principles will evolve as the related industries continue to mature.

116. [Grupo Globo CEO on Evolving rules and regulations surrounding AI](#)

Ever vigilant about industry trends, [Andreia Saad](#) takes note as Brazilian authorities crack down on companies that don't adequately secure personal data. Data protection among her responsibilities at the Latin American mass media conglomerate [Grupo Globo](#), she's insistent about staying compliant with evolving rules and regulations.

But she's just one woman, albeit with the impressive letterhead of legal director and data protection officer at the Rio de Janeiro-based company that employs around 14,000 throughout Latin America. Should any of those hires be remiss on privacy, Grupo Globo could face severe repercussions, but Saad's taking every precaution to prevent such a breach.

Late last year, she oversaw the company's release of new training programs for heightened awareness among the workforce. Program streaming and focus on digital products having brought Grupo Globo closer to its customers, much more personal data is in play, which, of course, increases risk.

"Our goal is to get all the people engaged," Saad tells Vanguard in January. "We need everyone to know the law and be aware that they need to comply."

While Saad's privacy team is pretty lean, consisting of five professionals, including a manager, technical analysts and lawyers, it is proactive with virtual seminars and training programs that can be fun and educational. She even included such lessons in an escape-room exercise last year.

“I love privacy issues,” she says. “But I know they may sound like legalese to some people, so trying new techniques for engaging them is important. We are doing well in that area, keeping our people more active in understanding issues and clarifying doubts about what they should do with personal data.”

She’s wired

More at ease with technology than perhaps many of her legal counterparts at other companies, Saad’s also immersed in a digitization project that includes developing tools and protocols for the company’s increased use of artificial intelligence.

While AI has many uses that enable productivity and enhanced quality, she says it has the potential to open many legal and regulatory issues, some of which have yet to be defined by the authorities. Grupo Globo thus must prepare for future rules, with Saad overseeing a dedicated team dealing with AI’s legal and technological issues.

“We discuss on a case-by-case basis all the issues, contracts and projects that involve AI,” she says. “Technology is more important than ever for the media industry. It can be used to streamline captioning, help writers in the process of story development and scriptwriting, personalize content recommendations and much more. It’s amazing what technology can do, but it raises so many issues of copyrights, privacy and ethics.”

Clarifying those complexities is part of Saad’s expanding role at the company, where she’s in her second go-around. An antitrust specialist early in her career, she oversaw that matter from 2010 to 2013 before returning to the firms where she had honed her skills. She marvels how the antitrust goal of ensuring fair-market competition has expanded to cover other areas, including regulation, corporate governance, privacy and data protection.

Antitrust background

Antitrust didn’t seem so far-reaching when Saad was commencing her legal career. A 2004 law graduate of the prestigious State University of Rio Janeiro, one of the best in Brazil, she began a 10-year stretch first as a trainee and later as an associate with the prominent Brazilian firm of Veirano Advogados, during which she enhanced her credentials with a degree in contracts law from Fundação Getúlio Vargas and a master’s in trade regulation, antitrust and competition law in 2009 from New York University School of Law.

That prepared Saad to go in-house with Grupo Globo, where she relished having just one client and immersing in projects from conception to completion. However, by 2013, as the new Brazilian Antitrust Law came into force, she felt it necessary to return to a major firm and garner antitrust experience in a broader range than media law.

She found that opportunity with the Rio de Janeiro firm of Mattos Filho, Veiga Filho, Marrey Jr. e Quiroga Advogados, one of the biggest firms in the country, becoming part of its prestigious antitrust team. In 2015, Saad took a leave from Mattos Filho and became an international associate at Cleary Gottlieb Steen & Hamilton in Washington D.C., practicing antitrust and regulatory law—highlights included being part of the team that helped Dow and Dupont finalize their \$145bn merger, a major transaction that made headlines at the time.

“I had such an amazing experience at Cleary,” she recalls. “I learned so much working with brilliant teams in London, Sao Paulo and New York. I also loved Washington. I had enjoyed the chaos of New York while studying for my master’s, but Washington was the better place for me.”

Perhaps for her son Antonio as well. Though he was just a 1-year-old, Saad said the toddler seemed to soak in some of the local culture, even learning a smattering of English that he’s since expanded upon as a now bilingual 9-year-old.

Back to Globo

But much as Saad enjoyed the U.S. capital, Brazil was still home, and the door to Grupo Globo remained open for her return as a legal specialist in March 2017. She’s since ascended the ladder, and as Saad celebrates the seventh anniversary of her return, she anticipates a busy agenda, what with Grupo Globo’s growth coinciding with so much on the regulatory and AI fronts.

“There’s much to do here, especially in the new area we’re building in AI,” she says. “I love working with my team and don’t plan on leaving anytime soon.”

In-house has also proved to be her preferred locale, though Saad says she’s grateful for the many lessons learned as an associate with major law firms. As to why Saad became a lawyer, she says her mother had been one, though she was never pushed into the profession. Exact sciences were Saad’s early interest, but, as a 17-year-old, she took an aptitude test that pointed her toward law. She’s gotten the best of both worlds: a legal role at a media company where knowledge of math, economics and technology is an asset.

And she wants to do even more. An in-house department, Saad emphasizes, shouldn’t be siloed or looked upon as an obstacle to company growth.

“Legal has got to have more of a strategic role,” she says. “I want to change the way people view the legal department. I want businesspeople to recognize our role and how we are their partners. As technology evolves and legal answers become less and less obvious, I believe our support is more essential than ever for the business to continue safely striving forward.”

117. [Pharu and his challenge of bringing analytics to Latin American culture](#)

Pharu and his challenge of bringing analytics to Latin American culture

October 27, 2023 by [Carolina Figueroa](#)

“Analytics can generate value in any industry, in any activity, under any type of question, using data,” says [Alexis Montecinos](#), cofounder and Managing Director of Pharu, which was born in November 2022 due to the need to carry out the strategy and hand-in-hand analytics towards different institutions, organizations, companies throughout the world.

[Pharu](#) is a Chilean startup specialized in building analytics models for interpretation, prediction and classification of information through machine learning and artificial intelligence (AI). In this short time, they have achieved significant growth that includes two partnerships, one with the [Innovation Center of the Catholic University](#) and another with Google.

Also check out: [Human talent management in startups with María Graciela Trincado – The Startup Ecosystem Episode #17](#)

[Alexis Montecinos](#) spoke with El Ecosistema Startup about the challenge of bringing machine learning and artificial intelligence to the culture of Latin American companies.

Their answers, below.

– How was Pharú born?

It is a product of what we were already doing between [Optium SBI](#), which was my consulting firm in Boston, and [Symnetics](#), which is the consulting firm of my partners in Chile, where [Alejandro Inzunza is](#). So, the context is this one that I have always told, in which I was solving this and people were considering models, but without added value and under our approach it gave added value, right? Because we did analytics based on the needs of the companies and their objectives, together with their strategy.

– What caught your attention about the field?

Basically, with analytics you can generate value in any industry, in any activity, under any type of question, using data. And that caught my attention because, as I had moved between industries between medicine, mass consumption, retail, rent a car, supermarkets, what do I know, so many different things, that a lot of value could be generated in all of them. I loved the feel because there was always something to do with the tools that could help organizations.

– How has the company's growth been from its beginnings until now?

The growth has been high and rapid because now in November we will celebrate just one year since Pharú was created. And we already have several clients, but not only that, we also have two partnerships, one with the Catholic Innovation Center, another with Google. And we have had several important milestones such as the invitation to País Digital, but we are also growing very strongly organically to develop new lines of business, so it has gone really well for us.

– What were the main challenges you have had to overcome?

And I would say more that it has been a process of adaptation, we had been doing this in the rest of the world, now more so in Latin America and perhaps we have had to adapt processes, certain cultures and certain types of things that are different in all organizations, but obstacles I would say no because as we had thought and planned this for a long time, we were super prepared to do it.

I believe that one of the main problems that this business has in cultural terms is that the world is still slowly preparing to completely acquire this current industrial revolution, 3.0, 4.0, whatever one wants to call it. And what does that imply? It implies that when I go to a firm and try to install a Machine Learning or Artificial Intelligence algorithm, it is not natural that people want to use it, adhere to the new technology, etc. Because effectively the majority of people working today were not from a generation in which neither school nor university had this type of technology.

And therefore that is an obstacle that organizations find themselves in because one arrives, sets up the algorithms, but finally has to convince people to execute it. And since we have developed this in many places around the world, in each place the culture is different. So what is easy to adapt in Chile may be very difficult to adapt in China or vice versa. And so in other countries on the planet and therefore that makes it much more complex.

– In which countries do you operate and how many clients have you had to date?

Look, we have had several clients and we are in operation in several countries - the United States and Chile - because it is a combination of things that has happened recently, I don't know if I would like to give the exact number because I think the privacy of the clients and many perhaps later between the numbers, things, what they themselves publish, may have associations that perhaps they do not want and for us it has always been super important to maintain privacy, but we have many clients in several countries and in various industries.

– What are Pharú's short and long term goals?

In the short term we would like to continue growing as we have been growing and continue opening new lines of business. Start opening new lines of business and in the long term be, of course, a macro consultancy with several fundamental pillars, one obviously analytics as a consultancy, another creation of artificial intelligence applications and a third which is very important and is learning where we like to teach the rest of the world from scratch how this can generate value for them and we find that a very important mission.

You may be interested in: [Breik: “The relationship with our clients and partners has helped us get to where we are today”](#)

Main learnings

– What are the main learnings that you have been able to take away from this experience that you can give to other entrepreneurs?

I believe that the main learnings are that the most important thing about our environment, artificial intelligence and machine learning, is that in the end a human being occupies the algorithm and that should never be left aside because if not the algorithm, whatever, the application of artificial intelligence is not going to enter as an organization should enter and it may not generate anything. And I believe that the greatest experience we have had being in different countries and in different industries is how to make the organizational climate, the environment of the workers, effectively appropriate for them to acquire this technology and use it to generate value. that we expect.

We are learning many things very quickly, but little by little we are understanding the environment, how to run the business better, how to manage the experience, but what I could maybe teach other entrepreneurs, look, this is what you have to do, these are the things. that you have to take into consideration.

Pharú has been a creation that has been going on for many years and that is why I do not want to be unfair to the environment and invent something, because although Pharú is 11 months old, we had been developing these learnings, technologies and developments before joining as Pharú for many years. We began to understand this technology long before they became famous in the world, so it has been a very considerable learning experience and therefore when we launched it in some way we understood how it worked, we understood the platforms, the technologies, the algorithms, not like we were just recently looking at the obstacles, trying to understand how to incorporate it into the organization. On the contrary, we had a lot of experience in this, so I would not like to invent something that is not true regarding what learning the entrepreneur should have.

I feel like a very, very incipient entrepreneur, we have been very lucky , we have honed a lot of professionalism in the teams that allows our product to be top level, but from there to be able to

teach someone and tell them these are the things that I recommend you as entrepreneurs, I don't think I have the knowledge to give that answer.

118. [News Corp AI powered News](#)

News Corp Australia's executive chair, Michael Miller, revealed that the media giant has been producing a staggering 3,000 news articles through [the use of AI](#) weekly.

This represents a remarkable breakthrough in the [realm of AI advancements](#).

AI-powered news generation

These AI-generated stories focus on hyperlocal topics, including weather updates, fuel prices, and traffic reports. The innovation is led by Peter Judd, News Corp's data journalism editor, and many articles carry his byline.

The initiative is part of the Data Local team's efforts to supplement content written by reporters for the company's 75 "hyperlocal" mastheads scattered across the country, such as Penrith, Lismore, Fairfield, Bundaberg, and Cairns.

News Corp confirms human oversight

While the stories are AI-generated, a News Corp spokesperson clarified that they are overseen by journalists, assuring the credibility and accuracy of the content. However, no explicit disclosure in the articles indicates their AI origin.

The spokesperson highlighted that the AI-generated content mainly serves as service information, updating local fuel prices daily, court lists, traffic and weather updates, and death and funeral notices.

The Data Local team, consisting of four staff members, ensures that all information and editorial decisions adhere to journalistic standards.

Boosting news subscriptions through artificial intelligence

During the World News Media Congress in Taipei, Michael Miller emphasised that the appeal of local news draws in a significant portion of News Corp's subscribers. He shared that 55% of all subscriptions are driven by their "hyperlocal" mastheads, which has recently increased with the launch of 24 new such titles.

These digital-only mastheads are established in regions with a population of at least 15,000 and are often staffed by a single journalist.

AI in the media landscape

News Corp's adoption of AI in news generation reflects a growing trend in the media industry. Many newsrooms in Australia are exploring ways to harness AI's potential.

The Australian Broadcasting Corporation (ABC) focuses on AI applications that enhance content accessibility, such as transcription of audio content, AI voice-powered text-to-speech delivery of articles, translation, and personalised recommendations.

However, Nine Entertainment is yet to share its specific AI policy.

As AI technology continues to evolve, it poses both opportunities and challenges for the media industry, raising questions about content authenticity, journalistic oversight, and the future of news production and consumption.

119. [State in battle to protect data privacy, enhance security in the AI age](#)

In an era where Artificial Intelligence (AI) is integrated into different facets of daily life, the government has said it is in the process of implementing robust safeguards to data privacy and security. The assurance by information, communication and the digital economy cabinet secretary Eliud Owalo comes at a time when the transformative potential of AI is being harnessed across the world amid growing concerns on the exposure of sensitive information to unauthorized access and use. Mr Owalo yesterday said stringent policies and regulations are being drafted to ensure the integration of AI adheres to ethical standards, preserve individual privacy rights while harnessing the potential of data-driven technologies. “Massive data is coming in to the government’s hands in the course of digitization and we have appropriate frameworks to ensure it remains private and secure. As a government, we are taking advantage of that process to strengthen the policy, legal and regulatory framework in the face of technological advancements,” the CS said during the fourth edition of the Nation Digital Summit. The forum in Naivasha, Nakuru County, whose theme is “Syneries in Digital Transformation and Artificial Intelligence”, brought together journalists, business leaders, policy makers, academia and tech enthusiasts. Among other subjects, the exploration of AI and its implications for the future of media was discussed. Mr Owalo said the benefits of AI should not compromise data integrity. The information Communications and Digital Economy Sector Working Group on Policy and Legislative Reforms is working on areas falling under the information and communication technology (ICT) sector’s mandate. According to the CS, the law has remained static amid significant changes in technology. “Even the resolutions from this summit should be forwarded to that committee whose tenure we have extended by three months. We should all, in the public and private sectors, think together even as we benchmark with the global standards on technology matters,” he said. Nation Media Group (NMG) CEO Stephen Gitagama said the company will adopt AI to enhance creativity and problem-solving. “The versatility of AI is amazing because we are harnessing that technology to improve efficiency and productivity with a human touch. We are also aware of issues touching on copyright, ethics and objectivity challenges and are being careful not to let AI be misused,” he said. The Nation Digital Summit is an event that aims to help organisations implement the best technology and digital strategies in accordance with global trends and consumer needs. The summit offers opportunities for learning, networking, and celebration with partners, customers, digital experts and industry leaders.

120. [Pfizer AI policy and position](#)

Policy Position on Artificial Intelligence Background Artificial Intelligence (AI) has the power to uncover and activate meaningful insights to revolutionize the pharmaceutical and healthcare industries. At Pfizer, we recognize that AI can be a powerful technology in support of our mission to create breakthroughs that change patients' lives. We see AI's significant potential to drive innovation by helping in numerous ways, including accelerating our research and development of new medicines and vaccines; in the diagnosis, treatment, and management of diseases; and by optimizing the manufacturing and delivery of important therapies to patients. We recognize that AI is transforming life sciences and has the potential to improve healthcare for patients across the globe. At a time when conversations and questions around the development and delivery of AI are increasing, Pfizer agrees that it is critical to take stock of both the promise and challenges of using these new tools, especially in advance of legislative and regulatory changes. We are eager to engage with policymakers around the globe on key issues described in this policy position as, together, we look to harness the power of AI for all. Pfizer's Commitment to Responsible AI Principles At Pfizer, we have the obligation to use AI ethically, responsibly, and purposefully to benefit our patients, customers, colleagues, and society. To that end, Pfizer has developed a set of Responsible AI Principles to provide a clear path for the company to utilize this technology. • Principle 1: We strive to design AI systems that empower humans and promote equity. We create and execute AI tools to empower humans and human decision-making while ensuring these tools do not completely substitute for humans. We strive to develop AI that is fair, inclusive, and avoids bias in its inputs, models, and outputs. • Principle 2: We respect individuals' privacy and the need for transparency in the utilization of data and AI. Transparency and trust are among the most important objectives in the adoption of AI in healthcare. Making systems explainable, where possible, is a key form of transparency that increases trust. Pfizer's policy requires that users are informed, where practicable, of the limitations and risks of the AI systems they are using. Pfizer incorporates privacy into the design of its AI systems. Patient data are tightly controlled, and internal processes are designed to ensure that the privacy, safety, and security of individuals are protected. • Principle 3: We take ownership of our AI systems. At Pfizer, we are accountable for ensuring that AI systems meet ethical, legal, regulatory, and sustainability standards. We commit to building AI that is safe, valid, and secure. Finally, we maintain necessary human controls over AI. Pfizer's Position on AI Policies Pfizer supports the evaluation of current policy frameworks to confirm they are fit-for-purpose and provide the flexibility needed to accommodate the rapidly evolving landscape of AI development and use across the life sciences and healthcare ecosystems. Where creation of new AI-focused laws, regulations, and guidances are deemed necessary, we support policies that promote responsible innovation while mitigating potential risks associated with the development and deployment of AI systems. Issued by Global Policy & Public Affairs, Pfizer Inc. -- Do Not Detail -- December 2023 Development and Use of AI Pfizer encourages policies that support the development and use of AI systems that are designed based on scientific research principles, protect intellectual property, and reflect ethical principles and values. We also encourage policies that foster the design of AI systems that empower humans and promote equity; such systems should be fair, inclusive, and avoid biases. At Pfizer, we ensure that our AI systems include humans as part of the decision-making process and strongly support policies that ensure humans are not removed from decision processes that could impact health outcomes. Regulation and Governance of AI Pfizer supports a patient-centric regulatory approach that relies on risk-based guardrails and fosters innovation while ensuring the appropriate data and privacy protections for patients. Importantly, Pfizer encourages alignment of regulatory frameworks in order to ensure

that AI advancements within the life sciences continue at pace. Misaligned approaches related to AI oversight within and across governments can lead to an overly complex and potentially burdensome approach for both developers and deployers of AI and could ultimately stifle innovation. Pfizer supports continual cross-sector and multi-disciplinary dialogue on guidances related to advancements in AI, as well as the need for oversight and governance of the ethical use of AI systems in healthcare. As part of these conversations, Pfizer supports efforts by policymakers to learn about current and potential future uses of AI, specifically in healthcare and the research and development of medicines and vaccines. Policymakers and regulators should continue to engage with life science and healthcare companies to understand where AI uses converge and, importantly, diverge from other industries. Transparency and Explainability To foster trust and confidence, Pfizer supports transparency regarding the limitations and risks of AI that could significantly impact individual rights, like people’s health and safety. This includes incorporating sufficient human oversight and control into design and implementation. Pfizer encourages the adoption of practices that allow for sharing of sufficient information to enable the intended user to understand how the recommendations are made, including explanations of the model’s process and decisions, where feasible. Pfizer encourages clear communications about the intended use and limitations of AI systems, to increase trust and confidence in the potential capabilities of these systems. Privacy and Informed Consent Pfizer supports policies that promote the design of AI systems in which privacy and informed consent are fully integrated as appropriate into the process of leveraging data sources for development. Training and education AI systems are vulnerable to biases, occurring at the point of data collection, the development of algorithms, and finally in the use of the system. Pfizer supports policies and pathways that promote the use of databases that are representative of the populations served by AI systems. Pfizer supports policies and guidances that aid in the development of tools, training, and educational programs that focus on reducing the potential for biases. Future Uses of AI in Healthcare Pfizer encourages research to assess the potential that AI systems may have on the ability to discover, develop, and deliver safe and effective therapeutics to patients, including identification of potential risks to individuals and the healthcare system. Pfizer supports exploration of the benefits to patients of future technological advances in AI systems (e.g., generative AI) that align with our existing responsible AI principles.

[121. Jnj policy and positions: doing the right thing with AI](#)

Doing the right thing: AI & ethics At Johnson & Johnson we aspire to use artificial intelligence (AI) in an ethical way, with Our Credo and our Code of Business Conduct as our inspiration and roadmap. AI and machine learning play an increasingly important role in delivering excellence at Johnson & Johnson. AI is helping to drive socially beneficial innovations and new ways of helping those we serve live healthier lives. For instance, it is used in drug development, robotic-assisted surgery, commercial activities, chatbots and smart manufacturing in our supply chain. Our ethical foundation for using AI—based on the principles of Fairness, Privacy, Security, Responsibility and Transparency—is embedded in how our employees work every day and is reflected in our Position on Ethics and Compliance and in a wide range of voluntary disclosures (see our Position on Transparency and our Position on Data Privacy). It also rests firmly on Our Credo, which challenges and inspires our employees to put the needs and wellbeing of those we serve first, and on our Code of Business Conduct, which provides guidance regarding ensuring an open and honest work environment. Fairness in AI We believe that for AI to be fair, it must treat Our Credo stakeholders—the patients, doctors and nurses, mothers and fathers, communities, employees and shareholders—in an equitable manner. We aim to include fair practices through each step of the

AI lifecycle, from development to deployment. Doing the right thing: AI & ethics

Doing the right thing: AI & ethics We aspire to identify data sources that are diverse and appropriate for the use case and represent the intended audience as we move along the AI lifecycle. And we strive to understand the methods by which data sets are collected and how external influences, such as biases that exist in healthcare, may affect them. Throughout this process, we seek to proactively identify any bias in the data, and we utilize the latest advancements in technology to improve the robustness of our models. By seeking to proactively understand the data sets used and by asking the right questions, we can work to correct bias when we identify it, mitigate its impact when correction is not reasonably possible, or discontinue an analysis when needed or appropriate. To remain true to Our Credo, we look to have human experts involved throughout the AI lifecycle and controls in place to monitor model outputs. Our AI models are also intended to be “explainable,” so that how a model makes decisions is understood and we can identify when and why it may produce biased results. When it is not possible to fully explain how an AI model works, we seek to design and monitor the AI model proactively so we can overcome and minimize potential bias. When possible, we strive to capture performance metrics and check performance differences to determine their potential real-world impact on the patients and customers we serve. We also acknowledge that the characteristics of data sets may change over time (called "drift"). This may require us to reexamine the data for new insights and evolve our models. Our attention to bias, transparency and security helps us monitor and understand the potential for drift and how to manage it. By understanding the limitations of data, by training our models, and by facilitating human review, we strive to deliver AI-embedded solutions and products for the benefit of our patients and customers. Respecting the right to privacy

Respecting and protecting an individual’s right to privacy is at the core of how we do business. Although AI has driven significant breakthroughs in drug discovery, precision medicine, manufacturing and diagnostics, realizing its true potential requires careful governance and a steadfast adherence to privacy and data protection laws. The responsible use of data and the importance of privacy are embedded in our Code of Business Conduct and our Position on Data Privacy. 2

Doing the right thing: AI & ethics The exponential growth of data, connectivity and computing power, coupled with an increased use of AI, requires an increasingly diligent approach to safeguarding privacy. To build and sustain the trust of the stakeholders who rely on us, it is essential that we not only comply with legal and regulatory requirements, but that we also ensure the following:

- We operate transparently;
- We store data in a secure environment with controlled access;
- Our employees are trained in Privacy and Information Security; and
- We only collect and use the personal information that is necessary and relevant for our purpose and ensure proper consents, notices and disclosures are secured or provided to individuals.

These commitments can be found in our public Position on Data Privacy, and updates to this commitment are contained in our annual Health for Humanity Report. Securing AI Across Johnson & Johnson, we work diligently to safeguard our networks and systems against evolving cyber threats and to deter unintended or unauthorized access to business and personal information. We secure elements of the AI lifecycle in accordance with relevant laws and regulations, and our employees use strategies, innovations and information assets in line with our policies and approved processes. Our commitment to protecting information assets and business integrity is spelled out in our Position on Information Security. Using AI responsibly

Our commitment to Our Credo stakeholders guides our efforts to ensure that AI is inclusive and generates consistent and reliable benefits. It is critical, for example, that healthcare professionals (HCPs) are free to make appropriate care recommendations in the best interest of their patients; AI should assist and not hinder this process. As an employer, we have a duty to our employees to

make sure AI does not interfere with fostering an inclusive and safe working environment. And, as we look beyond our walls, we expect our external partners to follow high legal and ethical standards when collaborating with Johnson & Johnson in developing and deploying AI. 3 Doing the right thing: AI & ethics In using AI, we have an obligation to be good stewards of data sets and bring the appropriate level of scrutiny—both human and digital—to maximize the quality of outputs. We should be mindful of potential bias and gaps in our data. We should look to ensure the validity of our data sources, and we should follow appropriate collection and use practices. We believe in clear accountability throughout the AI lifecycle, supported by robust quality assurance mechanisms, and we seek to deploy AI in a safe and secure environment. Making AI transparent Our Credo stakeholders are at the core of what we do and how we operate. That’s why we do our utmost to be transparent. For example, in the Janssen U.S. Transparency Report, we outline many of our transparency initiatives. When leveraging AI tools, transparency is essential in building trust with HCPs, patients and customers in all areas of our business. Building upon our established framework, such as Compliance, Operational, Finance and Cybersecurity, we seek to ensure there are adequate processes in place for data collection, management, curation and transformation, including how a model is built, used and monitored—all with the goal of making the unexplainable more explainable. Where the unknown creates confusion and suspicion, we believe appropriate transparency brings clarity and understanding of the AI tool’s benefits and limitations. A final word AI is a key component of the future of healthcare. The question is no longer whether AI will be used in the development, commercialization and delivery of future medicines and medical technologies, but how it will be used. The principles of fairness, privacy, security, responsibility and transparency guide our work with AI so that throughout the AI lifecycle, our employees operate with the highest levels of integrity required by Our Credo and our Code of Business Conduct. With these principles as our guide, we believe that AI will continue to play a central role in bringing life-saving medicines, technology and quality healthcare to patients and customers around the globe

122. [Takeda position on AI](#)

Takeda’s Position on Use of Artificial Intelligence (AI) Summary The Takeda position on Artificial Intelligence (AI) includes principles that provide a sustainable approach to the ethical use and deployment of AI systems across Takeda, its affiliates, and partners to ensure that we:

- Help our business innovate responsibly
- Prioritize medical and social benefit
- Promote freedom of choice
- Establish fair and balanced systems
- Build robust and reliable AI
- Ensure safe and secure platforms
- Strive for explainable AI
- Establish an auditable process
- Keep humans in the loop

Artificial Intelligence Defined AI has varying definitions across media and scientific literature. At Takeda, we adapt and simplify the technical definition proposed by the European Commission’s Expert Group on AI (see Appendix I): AI is a system or software that learns from data to find patterns, take actions, make decisions, or assist in decision making.¹ Takeda is committed to responsible AI that generates sustainable value by learning from and acting on insights derived from analytics and artificial intelligence. We also actively contribute to the broader scientific, industry, and technology communities that are strengthening and evolving AI practices. This is exemplified by our participation in the International Pharmaceutical Federation of Manufacturers & Associations (IFPMA) working groups and the MIT-Takeda Program that aims to “fuel the development and application of artificial intelligence to benefit human health and drug development.”² Given the rapid evolution of AI compared to the speed at which legislation, regulations, and guidance governing these technologies are developed, Takeda’s principles

provide direction for ethical decisionmaking around AI. Background Takeda strives to become the most trusted, science-driven, digital biopharmaceutical company. We understand that our work impacts people in a fundamental way – with regard to their health and when they are at their most vulnerable. We’re committed to following the highest ethical standards, including in the use of technology.³ Because AI is an emerging field with the potential to impact all areas of medicine from drug development to product distribution to patient care, it is imperative to clearly articulate and interpret general principles for its ethical use. The principles described in this document were established via the Takeda Ethics Advisory Council (TEAC). The TEAC is comprised of a diverse group of professionals that include prominent external ethics experts and selected Takeda leaders. The primary responsibility of the TEAC is to perform analyses of ethics topics and provide advice, informing Takeda’s development of robust and principled positions on these issues. Our principles for ethical AI were designed to encompass and extend the traditional principles of biomedical ethics including beneficence, nonmaleficence, autonomy, and justice.⁴ Takeda’s Perspective Takeda is committed to a responsible innovation approach that shapes our use of data and digital technologies. We strive to bring the best solutions to individuals, including solutions that incorporate cutting-edge AI systems that help discover new medicines, better understand fundamental biology, optimize treatments, or enhance the experience of patients, HCPs and others. Doing this well means investing in the practices and cultural change needed to make Takeda’s AI-based algorithms and digital infrastructure secure, ethical, and trustworthy. It also means recognizing that, because AI is a tool with broad application potential, its ethical considerations are often an evolution of existing biomedical ethics discussions and require cross-functional collaboration. We believe algorithms deployed by Takeda and its partners and vendors, should:

- 1) Comply with local and international laws and regulations (Legal AI). Software and algorithms are developed and deployed with appropriate legal oversight, and compliance is managed by experts in relevant laws and regulations.
- 2) Prioritize security and technical soundness (Robust AI). This should reflect best practices in the biopharmaceutical industry and within Takeda.
- 3) Align with the ethical criteria described in this document (Ethical AI). To make ethical AI a reality at Takeda, this document describes a framework of principles that will maximize the benefits of AI to individuals, the environment, and the sustainability of our business. These principles apply from the earliest moments of innovation, through the development of internal protocols, to the ultimate adoption of AI technology. The management of AI and its ethical design is an ongoing process that will be in continuous development with relevant experts and stakeholders. The following principles outline Takeda’s strategic approach to ethical AI:

- Help our business innovate responsibly Takeda recognizes that the deployment of AI is imperative to the sustainability of our business. We value AI systems that improve efficiency, enhance benefits, and minimize, as much as feasible, environmental impact.
- Prioritize medical and social benefit Takeda seeks to balance risk with providing clinically meaningful outcomes. We aim to always examine whether AI is the appropriate tool, pay particular attention to vulnerable groups, and to the extent possible and meaningful, include patient, HCP, and others’ input on AI systems design and use when AI may directly impact health.
- Promote freedom of choice We promote the building of AI systems that maximize our ability to deliver healthcare solutions without compromising an individual’s freedom to make their own choices. To the extent possible and meaningful, we aim to include patient, HCP and others’ perspectives during the development and implementation of AI systems.
- Establish fair and balanced systems Takeda believes the data used to train and test AI should be, to the extent feasible, epidemiologically representative of the intended populations, appropriately diverse¹, including, but not limited to, age, gender, race, ethnicity, and social determinants of

health. • Build robust and reliable AI Takeda seeks to build and test AI systems using best practices in machine learning and software engineering with independent test sets that are representative, to the extent feasible, of the intended population. When clinical use is involved, we encourage demonstrating performance in clinically relevant conditions using established methods such as rigorous testing, use of independent controls and test data, documentation, and - where possible - peer review, and open access sharing of our algorithms. • Ensure safe and secure platforms Takeda believes that personal data should be secure and anonymized when possible. Internal data governance practices align with Takeda's policies on Privacy and IT Security as well as Takeda's Position on Data Sharing and Reuse of Health Data. • Strive for explainable AI Takeda intends to provide patients, HCPs, and others with essential information about AI based systems. This includes a clear estimation of risk, communicated in a clear and contextually relevant manner to support human decision-making. The level, degree, and type of explanation may differ depending on need and technical feasibility. • Establish an auditable process In healthcare settings, Takeda promotes the use of AI systems that are fully documented and version controlled using industry standard best practices from testing through live use such that decisions can be traced to the version, data, and parameters used. • Keep humans in the loop Takeda believes that higher risk systems should operate with a human in the loop. Takeda seeks to develop and deploy AI systems that are continually subject to operational and ethical review and to promote personal accountability for the system's performance, including collecting feedback to improve the system. Conclusion Takeda recognizes that AI provides many opportunities both for the patients, HCPs and others we serve, as well as our company. We accept responsibility for its use and hold ourselves accountable to high standards when we deploy AI. Given the rapid evolution of AI compared to the speed at which legislation, regulations, and guidance governing these technologies are developed, these principles provide Takeda's commitment and framework for ethical decision-making around AI. These principles will be regularly revisited by Takeda to ensure they meet the expectations of patients, HCPs and others, both today and in the future. About Takeda Pharmaceutical Company Limited Takeda is a global, values-based, R&D-driven biopharmaceutical leader headquartered in Japan, committed to discover and deliver life-transforming treatments, guided by our commitment to patients, our people and the planet. Takeda focuses its R&D efforts on four therapeutic areas: Oncology, Rare Genetics and Hematology, Neuroscience, and Gastroenterology (GI). We also make targeted R&D investments in Plasma-Derived Therapies and Vaccines.

123. [AI in drug design](#)

When creating small molecule drugs, it is necessary to consider not only the direct action on the disease-causing target molecules and a good safety profile, but also delivery of the drug to the target organ or site through the bloodstream after administration to the body orally or by injection. In order to find small molecule compounds that meet these criteria, scientists undergo a process of trial and error, by

synthesizing compounds

evaluating the efficacy, physicochemical, pharmacokinetics, and safety profiles of the synthesized compounds

analyzing the data and designing the next compound to be synthesized

This trial and error process takes several years, and the know-how has tended to rely on the scientists' rules of thumb. Therefore, Eisai is working to find drug candidates more efficiently by utilizing AI technologies such as machine learning and deep learning.

Evaluation of Compounds by AI

Through repeated trial and error, we have accumulated experimental data on efficacy, physicochemical, pharmacokinetics, and safety profiles of a large number of compounds. The accumulated data includes many insights created by Eisai's strength in chemistry. Such data is fed into machine learning and deep learning to elucidate the relationship between chemical structure and experimental data (efficacy, physicochemical, pharmacokinetics, and safety profiles). The trained machine learning and deep learning models enable scientists to predict efficacy, physicochemical, pharmacokinetics, and safety profiles from their chemical structures without synthesizing compounds, and support the design of new compounds by scientists.

Compound Design by AI

These models that predict efficacy, physicochemical, pharmacokinetics, and safety profiles can evaluate hundreds of thousands of compounds in less than a day. Taking advantage of this feature and combining it with deep generative models, AI identifies compounds with desired features (predicted profiles) from a huge number of compounds generated on a computer, and proposes them to scientists. Scientists review the proposal and provide feedback (e.g., changing instructions to the AI). After receiving feedback, the AI will make another proposal. In several drug discovery projects, we are working to efficiently create drug candidates by advancing synthesis and evaluation of compounds designed by collaboration between AI and scientists.

124. [Harnessing the power of AI](#)

Artificial intelligence is boosting the drug discovery and development process

Over the past few decades, we've witnessed the power of machine learning (ML) and artificial intelligence (AI) in applications such as language translation, stock trading and space exploration. While many of the more public-facing uses of AI have been driven by the tech sector, scientists around the world have also been working to harness it to ask bigger questions and address previously intractable challenges in human biology and disease.

"The traditional drug development process is linear and sequential," says Casper Hoogenraad, Vice President and Head of Neuroscience in Genentech's Research and Early Development (gRED) organization. "Researchers start with a single target that, based on disease biology or human genetics, is dysregulated and then figure out what kind of therapeutic might modulate the activity of that target be it a small molecule, an RNA approach, or a large molecule, like an antibody." Advancing AI tools, such as ML, in drug discovery and healthcare is more important than ever as drug developers are moving beyond the universe of familiar targets and are tackling increasingly challenging ones to treat more complex diseases with high unmet need.

Scientists are using these tools to mine data for insights that are unreachable with traditional methods, at a scale and speed that were previously unattainable.

As we continue to push the boundaries of drug discovery, we need new approaches that allow us to ask questions beyond single targets or biological pathways. We need to understand how numerous potential drug targets work together to drive disease.

Azad Bonni

Senior Vice President and Global Head of Neuroscience & Rare Diseases, Roche Pharma Research & Early Development (pRED)

To accomplish this, we need a better, higher throughput, and more parallel way of working. Genentech and Roche are doing just that, striving for the multiplicative benefits of combining advanced computation with innovative research methods. This allows us to ask bigger questions and make immense progress in our understanding of human biology. In turn, this enhanced insight uncovers new therapeutic targets and informs the design and optimization of novel medicines.

Harnessing AI

Genentech and Roche are currently applying ML across disease areas and therapeutic modalities, with the goal of creating better models for drug discovery that are predictive, generative and interpretable. This trifecta of model characteristics could be used to predict whether a specific molecule can access a target; generate a molecule to bind to that target; and explain how the target and molecule interact with each other.

“For example, ML has become an invaluable tool to discover relationships from cellular profiling data at massive scale,” says Barbara Lueckel, Head of Research Technologies, Roche Pharma Partnering. “And we are also seeing exciting progress in using ML to predict protein structures, eventually bearing the promise for new drug design of complex molecules.”

We’d like to understand how incredibly complex biological networks misfire or dysregulate in disease and identify the best points to intervene to restore health. AI is already transforming this field, and we are further building this technology to make discoveries we couldn’t uncover with traditional methods.

Tommaso Biancalani

Senior Principal Scientist and Director AI/ML, Genentech

For example, Genentech scientists in our AI/ML, infectious disease and computational chemistry departments are also using AI to discover new antibiotics. To eliminate bacterial pathogens, antibiotics must penetrate the outer layer (the membrane) of the target. But pathogens have developed ways to keep antibiotics out, and determining which antibiotics can penetrate the membrane can be a laborious process. So, Genentech scientists are using AI technology to examine the chemical structure of billions of potential antibiotics and determine which ones have the potential to bypass the pathogen’s membrane and eliminate it. Then they can synthesize those and test them in the lab.

Looking at the big picture, when ML is applied in a loop with experiments and data, it bears the potential to impact target and drug discovery in a really powerful way, amplifying many existing efforts at Roche and Genentech.

Barbara Lueckel

Head of Research Technologies, Roche Pharma Partnering

Partnering on a Revolutionary New Approach

Advanced computation is a multifaceted and rapidly evolving field. To supplement our internal efforts and stay at the leading edge of the field, Genentech and Roche have also been engaging with external collaborators.

In December 2021, Roche and Genentech entered into a collaboration with Recursion Pharmaceuticals to explore new territories of cell biology and develop new treatments in key areas of neuroscience and an oncology indication. The partnership will leverage Recursion's technology-enabled drug discovery platform in combination with our extensive single-cell data generation and ML capabilities to cast a wide, comprehensive net for novel drug targets, and advance and expedite the development of small molecule medicines.

Unlike the conventional approach, which starts with known targets, the partnership will generate and analyze different types of cellular and genetic data – at a huge scale – to build unprecedented maps of human cellular biology. These maps can be leveraged to identify novel biological relationships and ultimately help discover new targets to bring better medicines to patients faster.

“We're layering a lot of datasets, including high-resolution imaging of how cells respond to genetic changes and chemical perturbations, or disturbances, along with data on how small molecules affect those responses – and using AI to analyze it all,” Bonni says.

Bonni adds that this could be a paradigm shift in how we identify new targets along with therapies to match. This partnership can help identify new medicines that are unattainable using standard methods. It's an approach that will be particularly useful in neuroscience, a difficult field with a limited number of promising targets and the well-known challenge of getting medicines across the blood-brain barrier.

The scale of this project is almost unheard of. We'll be screening libraries of small molecules in parallel with genetic perturbation and RNA profiling approaches, so we'll have an immediate path forward with potential medicines, which is a decisive benefit. There is a lot of risk involved in pursuing novel targets because we just don't know enough about the underlying biology. Getting more confidence about targets and potential treatments would be a huge leap forward in neuroscience and other disease areas.

Casper Hoogenraad

Vice President and Head of Neuroscience, Genentech Research and Early Development (gRED)

A Strong Commitment

The Recursion collaboration complements other Roche and Genentech partnerships that could improve various aspects of drug discovery and development. In July 2020, Roche and Genentech entered into a collaboration with Reverie Labs to utilize AI for the discovery and development of next-generation kinase inhibitors. In October 2020, Genentech partnered with Genesis Therapeutics to use their deep learning and molecular simulation platform to discover small molecules for challenging targets that would elude other methods. And in August 2021, Genentech acquired Prescient Design, a company with a deep-learning protein design platform and extensive

expertise to help identify and design antibodies, with the eventual goal of rapidly designing therapy candidates in silico (on the computer).

Scientists at Roche are also seeking novel approaches to the identification of adeno-associated virus (AAV) capsids in partnership with Roche subsidiary Spark Therapeutics and Dyno Therapeutics. Today's gene therapies are delivered using naturally occurring viruses, which can carry limited payloads and only target certain tissue types. With Dyno's AI-powered CapsidMap technology, the partners aim to optimize tissue targeting and immune-evading properties, in addition to improving packaging capacity and manufacturability of gene therapy solutions for central nervous system (CNS) and liver diseases.

These partnerships, among others, combined with our internal research efforts, exemplify Roche and Genentech's commitment to advanced computation, and our firm belief that the digitization of drug discovery and development has real potential to make a meaningful difference for patients.

The drug discovery field is at a turning point. "I am more encouraged than I have ever been," says Lueckel. "The coming years will further demonstrate for which applications advanced computational approaches like ML live up to their promise, but I am optimistic that these technologies will significantly enhance our efforts to bring new medicines to patients as quickly and efficiently as possible."

125. Ethical and responsible use of AI

Taking a human-centred approach in using Artificial Intelligence to reimagine medicine.

AI is helping Novartis increase patient access, improve customer experience, drive automation, provide predictive analytics and detect potential misconduct. It also has the potential to be used to improve the speed and accuracy of diagnosis, treatment protocols, drug discovery, drug development, patient monitoring, and patient care, among other applications that will improve patients' lives and optimize the healthcare ecosystem.

These technological developments come with both opportunities and challenges, leading to important questions which, as a leading medicines company, we need to address thoughtfully and affirmatively. With AI playing such a critical role in enabling our digital strategy and transformation, we recognize the need to define clear ethical principles around AI. Hence, Novartis is committed to deploying AI systems in a transparent and responsible way. We will ensure that the use of AI systems has a clear purpose, that is respectful of human rights, and is accurate, truthful, not misleading and appropriate for the intended context.

Our principles for ethical use of AI

Novartis believes that any development, application or use of AI systems should be governed within the following ethical principles which are fully aligned to the Novartis Code of Ethics principles and commitments:

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Empower Humanity

At Novartis, our values and culture are driven and defined by our purpose to reimagine medicines to improve and extend people's lives. Our everyday decision making is based on our ethical principles, as outlined in our Code of Ethics. These values and ethical principles form the basis from which we design, implement, and deploy AI. Novartis is committed to:

Enforcing human-centric design in the deployment and use of AI systems;

Building a mutually beneficial relationship between human knowledge, expertise and decision-making and the computational machinery which provides inferences and connections between data at scale;

Respecting the rights and dignity of all people, and striving to prevent and mitigate identified adverse human rights impacts that may arise through our use of AI;

Continuously assessing AI advances to ensure they proceed from within Novartis' context and are determined by Novartis, rather than influenced by external factors;

Monitoring the impacts of AI to evolving human and societal values.

Accountability

As an accountable organization, Novartis is committed to establishing robust governance over the design and use of AI. Such rigorous governance includes appropriate leadership and oversight, risk and impact assessments, appropriate policies and procedures, transparency, training and awareness, monitoring and verification, response and enforcement. Therefore, Novartis is committed to:

Maintaining human accountability in decision-making processes of designing, delivering and operating AI systems;

Providing autonomy to associates in the controlling, creation, training, deployment and operation of AI systems;

Performing business and regulatory impact assessments of AI systems within the Novartis value chain before integration and deployment;

Applying Novartis Information Technology (IT) and Operation Technology (OT) controls and processes to plan, implement and continuously monitor AI systems, in alignment to the commitments in the Code of Ethics;

Proactively monitoring and mitigating potential negative AI consequences;

Enabling the auditability of the AI systems via validation and verification functionalities and keeping an audit trail in line with best practice.

Mitigate Bias

Data and algorithms used in AI systems need to meet Novartis' strong commitment to fairness and non-discrimination detailed, inter alia in our Code of Ethics; particularly where AI systems are used in sensitive areas that closely touch critical decisions regarding drug development, socio-economic benefits, hiring and matters that relate to human behavior. We are committed to mitigating the risk of bias throughout the process, from data gathering, model creation and application of the model. To that end, we will strive to:

Design, develop, test, train and operate AI algorithms based on inclusive and representative data to eliminate possible biases and known discriminatory aspects such as race, gender, ethnicity, sexual orientation, political or religious beliefs;

Use data samples that are representative of the studied and analyzed population to eliminate or prevent unconscious bias;

Perform a risk impact assessment on the AI systems before their use in production to eliminate the risk of bias or discrimination;

Develop and use AI systems in ways that reflect the social and cultural diversity of Novartis;

In the short-term, assess, acquire or develop tools and establish techniques to assess statistical bias in data-sets from external sources – mitigating bias in all data sourced from outside of Novartis;

Ensure the responsible use of AI when applied to the real world, as outlined in our 'Empower Humanity' Principle.

Respect Privacy

In some instances, AI systems are 'trained' on and use personal information. Outputs of AI systems may also impact the privacy of individuals. Novartis has established and implemented Global Data Privacy Principles that govern the use of personal information. These Principles apply without exception to the design and use of any AI system. The Principles are:

Transparency: We are transparent about what personal information we process, how and why we collect it, use it, and who we share it with. We explain this in clear and simple language;

Legitimate and Meaningful Collection: We connect all collection and use of personal information to specific business purposes related to how we operate, innovate or engage;

Responsible and Sustainable Processing: We use personal information only in ways compatible with the purposes for which it was collected. We facilitate Individuals to exercise their rights with regards to their personal information;

Security: We protect personal information by using reasonable safeguards to prevent its loss, unauthorized access, use, alteration or unauthorized disclosure;

Integrity and Quality: We take appropriate steps to keep personal information accurate and up to date;

Minimal Retention: We keep personal information only for as long we can legitimately use it.

Transparent and Explainable

Novartis strives to create transparency around the design and use of AI systems to explain how such systems work through:

Short term: Openly disclosing / informing end-users when they are interacting with an AI system;

Mid-term: Enabling the auditability and traceability of the decision pathways taken by AI systems using IT tools and infrastructure;

Mid-term: Transparently communicating and explaining the limitations, purpose, decisions and capability of AI systems as new visualization models are developed;

Ensuring the use of AI systems has a clear purpose that is accurate, truthful, not misleading, and appropriate for their intended context; aligning with the principles of Beneficial AI.

Safe and Secure

AI systems need to be safe, performing as intended, secure and resistant to compromise via unauthorized parties. Hence, in the design, implementation and use of AI systems, Novartis commits to the following:

Technically robust systems that translate in-depth human understanding to stable operations based on a review of impact assessments and the specific context of the use-case;

If the AI systems are deployed in relation to products and manufacturing environments, we are committed to reporting adverse events within 24 hours of discovery to the Novartis Safety Department and quality complaints to Quality Assurance, and then transparently communicating the risks of our medicines and devices to regulatory authorities;

In relation to confidentiality, Integrity and Availability of Novartis Information, we hold ourselves accountable for the information and technology that we handle, with an obligation to safeguard our patients' and partners' information.

Environmental Sustainability

AI systems need to be designed sustainably, inter alia, assessing the resource usage and energy consumption to limit the risks to the environment. To address the environmental footprint of AI systems (e.g. assessing the resource usage and energy consumption), the Environmental Sustainability principle within the Code of Ethics would apply. This principle lays out that Novartis is committed to minimizing the environmental impact of our activities and products over their lifecycle. Novartis is aiming for carbon neutrality across the supply chain by 2030. In AI, this means addressing three broad areas:

Short term: Partnering with like-minded sustainable technology platforms. Novartis will introduce sustainability as a key component in procurement of the computational infrastructure required for AI solutions and services;

Mid-term: Ensuring optimal use of algorithms with internal implementation of AI, by training data scientists to be selective about the algorithms they want to train upfront, before committing them to the computational power required to deploy deep learning;

Long-term: Reviewing internal operations, such as Novartis Technical Operations (NTO) to assess how AI can be used to reduce carbon footprint.

Review, Learn and Adapt

AI systems need to support and enable professional standards. As such, Novartis is committed to:

Ensuring and maintaining professionalism and accountability in the creation and deployment of AI systems; ensuring that associates have the necessary depth of understanding of the ethical implications;

Implementing and using AI systems that augment, complement and empower human capabilities and skills to improve speed, quality and maximize impact in a positive way;

Enhancing the offering of our Data Science Academy to educate data scientists as well the broader group of Novartis associates on the use of AI;

Empowering, educating and training associates in the short-term to have the right ethical professional awareness (knowledge, experience and required skills) as they use or operate AI systems, to ensure that ethical commitments (as laid out in the Code of Ethics) are not compromised; moving in the mid-term to a system of certification.

126. [AI in EMS the future is here](#)

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127. [Sanofi Responsible AI principles](#)

Introduction At Sanofi, our mission is to build a healthier, more resilient world. We turn the impossible into the possible by discovering, developing, and delivering medicines and vaccines for millions of people around the world. We are using AI to enhance our ability to achieve this mission by accelerating drug discovery, enhancing clinical trial design, and improving the manufacturing and supply of medicines and vaccines. However, despite the huge promise of the application of AI to the biopharmaceutical enterprise, we recognize that there are significant public concerns regarding the increasing use of AI, particularly in the areas of misinformation, loss of

human oversight, liability, lack of transparency or accountability, cybersecurity and privacy. To address these concerns, we have implemented a robust governance and accountability framework across the company to help ensure that our development and use of AI is done responsibly, with a full appreciation of the potential risks and how to control for them. Key Messages 1) How we protect patients and other stakeholders and maximize AI's opportunity responsibly: By building a robust governance framework that ensures we harness AI's potential fully, but responsibly, we will drive AI-enabled innovation at scale both internally and externally in a manner that prioritizes fairness, transparency, safety, accountability and eco-responsibility. 2) How we mitigate the risks inherent in the application of AI: We manage AI risks by adhering to a comprehensive, thoughtful, risk-based approach that is responsive to the changing AI regulatory landscape and enforces proportionate governance and technology controls to manage AI innovation responsibly. We take on this accountability from design through deployment and use of AI systems, including those from third parties. The Pillars of our Responsible AI Framework Sanofi's Responsible AI Use framework aligns with major international frameworks, especially the Organization for Economic CoOperation and Development (OECD)'s AI Principles[1]. In particular, Sanofi endorses and supports IFPMA's Artificial Intelligence Principles[2] as listed below, and these principles are embedded into our Responsible AI Framework: Empowering Humans, Accountability, Human Control, Fairness and minimization of bias, Privacy, Security, and Safety by Design, Transparency, Explainability, and Ethical Use. Our framework will evolve and adapt as national legislative and regulatory frameworks emerge to ensure we are fully compliant with public expectations, and legal and regulatory requirements. Our Responsible AI Use Framework also reflects our existing dedication to both ethics and business integrity. Accountable to Outcomes: Our overarching commitment is that we hold ourselves accountable throughout the entirety of the AI system life cycle, based on our Responsible AI Pillars described below. We will adhere to all associated risk-based controls at all stages of the AI life cycle from design, development and deployment, through to use. Fair & Ethical: We will design, develop, deploy and use AI, such that we prevent bias and uphold fundamental human rights, which includes human-centered values especially respect for privacy, data protection, non-discrimination, autonomy and justice. We will adhere to existing laws surrounding these ethical values and we will take into account how our AI System impacts the world around us, both directly and indirectly. Robust & Safe: We will design, develop, deploy, and use AI systems so that they do not cause harm to users. We strive to make our AI systems accurate, adaptable, secure, and reliable from the outset. Transparent & Explainable: We will communicate when and how our AI systems are used and their limitations. We will provide opportunities for end-users to question, reject and understand AI system outputs wherever possible. We will use end-user and stakeholder's feedback to improve our AI Systems. Eco-Responsible We will design our AI systems to minimize their environmental footprint. We will mitigate AI Risks through our risk-based approach: To mitigate risks, Sanofi employs a risk-based approach to AI regulation. Our approach includes the thorough assessment of AI risk through our Sanofi AI Risk Assessment procedures, the identification of appropriate controls depending on assigned risk level, and governance to oversee the assignment, execution and enforcement of controls. Our commitment to Responsible AI reflects our dedication to ethics & business integrity, therefore we have integrated Responsible AI into our companywide Code of Conduct - Sanofi. We have also committed to train all our employees in Responsible AI and monitor our implementation of our Responsible AI Framework to ensure that our use of AI improves the lives and well-being of our patients.

128. [Artificial intelligence at CSL](#)

When CSL assembled last year at its Data Science Summit in Bern, Switzerland, the company brought together participants from every aspect of its operations, from Finance to Pharmacometrics.

With data science and artificial intelligence playing an ever-increasing role, Global Head of Digital Transformation and Execution Systems Karen Etchberger posed a question relevant to all: “How do we move from where we are today to a future where we can bring this ambition to life?”

John Thompson, CSL’s Global Head of Advanced Analytics and Artificial Intelligence, is helping to lead that effort. Thompson has been on the forefront of artificial intelligence and its use in business for more than 30 years. He has helped build analytic systems for giants of global industry like Coca-Cola, Anheuser-Busch and Dell. Now, he’s doing the same for CSL.

“This company has grown tremendously and has been making smart moves along the way,” Thompson said. “Now it’s really starting to see the value of data and analytics.”

Developing a Data Science Framework

CSL is taking a two-pronged approach that includes a Center of Excellence and a Community of Practices on advanced analytics and AI, Thompson said. Data scientists are part of both groups and working on numerous projects throughout CSL. The setup ensures each project is the right one to address individual team needs while benefitting CSL as a whole.

“There’s a lot do,” Thompson said. “My days go from dawn to dusk every day and I feel as energized as I did when I started in the morning. It’s an exciting time to be here.”

Artificial intelligence and machine learning can be used to comb through vast sets of data to find outliers or similarities that can illuminate understanding of any number of scenarios. Like other global industries, Thompson said the company will be using artificial intelligence to improve supply chain efficiency and to comply with regulatory and legal requirements.

Making AI Work for Patients

But CSL also wants to use those powerful engines to solve the burdens faced by patients with rare and serious diseases. A major goal in CSL Behring’s AI push is to shorten the amount of time between the onset of symptoms for a patient and an accurate diagnosis. In Pharmacovigilance – the front lines of patient safety - robotics process automation can speed the flow of information and improve operational efficiency, said Richard Wolf, Executive Director, Global Clinical Safety and Pharmacovigilance.

Wolf says his team is also working with others across industry to find areas where AI and natural language processing can be utilized to ensure crucial information is readily surfaced, One day, he believes it could even serve to predict risks associated with certain medications.

“We do think there is a place for artificial intelligence in our work,” Wolf said. “And we’re taking a careful and thoughtful approach toward implementing it.”

Analytics can also help CSL uncover important medical insights from vast amounts of “real-world data,” such as physician notes in a patient’s chart. [Real-world data](#) are obtained outside of

randomized controlled trials and generated during routine clinical practice. Prior to advanced analytics and AI, this information existed but it was difficult to gather and analyze.

Haley Kaplowitz, Executive Director & Global Head of Safety Sciences, is leading an organization-wide effort to employ analytics as a key tool for gaining real-world evidence to be used in decision-making across the product life cycle.

Both real-world data and real-world evidence are playing an increasing role in healthcare decisions, particularly from regulatory authorities and payers. They may also help predict patient groups at increased risk of adverse events and demonstrate product effectiveness and differentiation in the marketplace, Kaplowitz said.

“The industry is under increasing pressure to provide evidence and demonstrate the value of products to multiple stakeholders, particularly in actual clinical practice,” she added. “Real-world evidence is inherent to reach this goal and increasingly crucial to ensure patient access and commercial success.”

129. [Integrating tech into healthcare profitable – Firm](#)

Fidson Healthcare Plc has advised its distributors to integrate technology into healthcare as it is profitable.

A statement by the firm made available after a two-day conference held in Lagos for its top distributors said it was organised to foster stronger business relationships between the company and its partners while rewarding them for their unwavering support and patronage over the years.

Speaking at the opening ceremony, the Managing Director, Dr Fidelis Ayebae, charged them to adopt innovative and feasible ways to run their business operations for greater returns.

“The world as we know it is continuously evolving, and it is important we adapt to the changes that come with it. The advent of technology has introduced new and efficient ways to carry out business operations in ways that are cost-effective and less time-consuming. “At Fidson, innovation is one of our core values; this implies that we constantly examine, implement, and invest in new and innovative infrastructure and skills to carry out all our business operations to reduce costs and maximise profit. I will encourage you all to do the same. The integration of technology into business always pays off.”

Ayebae commended the distributors for the loyalty shown to the company’s brands over the years. He stated that they were an important part of Fidson’s success story.

“Our goal since we began in 1995 has been to create an indigenous organisation that embodies the high standards of the Nigerian healthcare and pharmaceutical industry. Your ongoing support throughout the years serves as evidence that you share in that vision, and we are thankful for it.”

The programme featured insightful discussion sessions held by renowned healthcare and business administration experts including Dr Folashade Daniel (Cardiologist) and Chief Executive, Business School Netherlands Nigeria, Prof. Lere Baale, who enlightened the attendees on ways to improve and build shock-resistant businesses by adopting tested and well-planned business models while giving utmost care and consideration for their medical wellbeing.

130. Synthetic and manipulated media policy

You may not share synthetic, manipulated, or out-of-context media that may deceive or confuse people and lead to harm (“misleading media”). In addition, we may label posts containing misleading media to help people understand their authenticity and to provide additional context.

What is in violation of this policy

In order for content with misleading media (including images, videos, audios, gifs, and URLs hosting relevant content) to be labeled or removed under this policy, it must:

Include media that is significantly and deceptively altered, manipulated, or fabricated, or

Include media that is shared in a deceptive manner or with false context, and

Include media likely to result in widespread confusion on public issues, impact public safety, or cause serious harm

We use the following criteria as we consider posts and media for labeling or removal under this policy as part of our ongoing work to enforce our rules and ensure healthy and safe conversations on X:

1. Is the content significantly and deceptively altered, manipulated, or fabricated?

In order for content to be labeled or removed under this policy, we must have reason to believe that media are significantly and deceptively altered, manipulated, or fabricated. Synthetic and manipulated media take many different forms and people can employ a wide range of technologies to produce these media. Some of the factors we consider include:

whether media have been substantially edited or post-processed in a manner that fundamentally alters their composition, sequence, timing, or framing and distorts their meaning;

whether there are any visual or auditory information (such as new video frames, overdubbed audio, or modified subtitles) that has been added, edited, or removed that fundamentally changes the understanding, meaning, or context of the media;

whether media have been created, edited, or post-processed with enhancements or use of filters that fundamentally changes the understanding, meaning, or context of the content; and

whether media depicting a real person have been fabricated or simulated, especially through use of artificial intelligence algorithms

We will not take action to label or remove media that have been edited in ways that do not fundamentally alter their meaning, such as retouched photos or color-corrected videos.

In order to determine if media have been significantly and deceptively altered or fabricated, we may use our own technology or receive reports through partnerships with third parties. In situations where we are unable to reliably determine if media have been altered or fabricated, we may not take action to label or remove them.

2. Is the content shared in a deceptive manner or with false context?

We also consider whether the context in which media are shared could result in confusion or suggests a deliberate intent to deceive people about the nature or origin of the content, for example, by falsely claiming that it depicts reality. We assess the context provided alongside media to see whether it provides true and factual information. Some of the types of context we assess in order to make this determination include:

whether inauthentic, fictional, or produced media are presented or being endorsed as fact or reality, including produced or staged works, reenactments, or exhibitions portrayed as actual events;

whether media are presented with false or misleading context surrounding the source, location, time, or authenticity of the media;

whether media are presented with false or misleading context surrounding the identity of the individuals or entities visually depicted in the media;

whether media are presented with misstatements or misquotations of what is being said or presented with fabricated claims of fact of what is being depicted

We will not take action to label or remove media that have been shared with commentary or opinions that do not advance or present a misleading claim on the context of the media such as those listed above.

In order to determine if media have been shared in a deceptive manner or with false context, we may use our own technology or receive reports through partnerships with third parties. In situations where we are unable to reliably determine if media have been shared with false context, we will not label or remove the content.

3. Is the content likely to result in widespread confusion on public issues, impact public safety, or cause serious harm?

Posts that share misleading media are subject to removal under this policy if they are likely to cause serious harm. Some specific harms we consider include:

Threats to physical safety of a person or group

Incitement of abusive behavior to a person or group

Risk of mass violence or widespread civil unrest

Risk of impeding or complicating provision of public services, protection efforts, or emergency response

Threats to the privacy or to the ability of a person or group to freely express themselves or participate in civic events, such as:

Stalking or unwanted and obsessive attention

Targeted content that aims to harass, intimidate, or silence someone else's voice

Voter suppression or intimidation

We also consider the time frame within which the content may be likely to impact public safety or cause serious harm, and are more likely to remove content under this policy if immediate harm is likely to result.

Posts with misleading media that are not likely to result in immediate harm but still have a potential to impact public safety, result in harm, or cause widespread confusion towards a public issue (health, environment, safety, human rights and equality, immigration, and social and political stability) may be labeled to reduce their spread and to provide additional context.

While we have other rules also intended to address these forms of harm, including our policies on violent threats, civic integrity, and hateful conduct, we will err toward removal in borderline cases that might otherwise not violate existing rules for Posts that include misleading media.

What is not a violation of this policy

We seek to protect public conversation surrounding various issues. Media often accompany these conversations and encourage further discourse. In the absence of other policy violations, the following are generally not in violation of this policy:

Memes or satire, provided these do not cause significant confusion about the authenticity of the media;

Animations, illustrations, and cartoons, provided these do not cause significant confusion about the authenticity of the media.

Commentary, reviews, opinions, and/or reactions. Sharing media with edits that only add commentary, reviews, opinions, or reactions allows for further debate and discourse relating to various issues and are not in violation of this policy.

Counterspeech. We allow for direct responses to misleading information which seek to undermine its impact by correcting the record, amplifying credible information, and educating the wider community about the prevalence and dynamics of misleading information.

What happens if you violate this policy?

The consequences for violating our synthetic and manipulated media policy depends on the severity of the violation.

Post	Deletion
For high-severity violations of the policy, including misleading media that have a serious risk of harm to individuals or communities, we will require you to remove this content.	

Labeling
In circumstances where we do not remove content which violates this policy, we may provide additional context on posts sharing the misleading media where they appear on X. This means we may:

Apply a label and/or warning message to the post

Show a warning to people before they share or like the post;

Reduce the visibility of the post on the platform and/or prevent it from being recommended;

Turn off likes, replies, and Reposts; and/or

Provide a link to additional explanations or clarifications, such as relevant X policies.

In most cases, we will take a combination of the above actions on posts we label.

Account

locks

If we determine that an account has advanced or continuously shares harmful misleading narratives that violate the synthetic and manipulated media policy, we may temporarily reduce the visibility of the account or lock or suspend the account.

131. [Linkedin engineering responsible AI](#)

LinkedIn was founded with a clear vision to create economic opportunity for every member of the global workforce. In 2023, we are seeing transformative advances in AI that have the potential to help us accelerate our progress toward that vision.

AI is [not new](#) to LinkedIn. LinkedIn has long used AI to enhance our members' professional experiences. By leveraging the power of AI, we help our members connect, increase productivity, and achieve success in their careers.

While AI has enormous potential to expand access to opportunity and ultimately transform the world of work in positive ways, the stakes are high. The use of AI comes with risks and potential for harm. That's why, consistent with our commitment to build a [trustworthy](#) platform, we must continue to use AI responsibly. Inspired by, and aligned with, [Microsoft's leadership](#) in Responsible AI, we are sharing the Responsible AI Principles that we use at LinkedIn to guide our work:

Advance Economic Opportunity: People are at the center of what we do. AI is a tool to further our vision, empowering our members and augmenting their success and productivity.

Uphold Trust: Our commitments to privacy, security, and safety guide our use of AI. We take meaningful steps to reduce the potential risks of AI.

Promote Fairness and Inclusion: We work to ensure that our use of AI benefits all members fairly, without causing or amplifying unfair bias.

Provide Transparency: Understanding of AI starts with transparency. We seek to explain in clear and simple ways how our use of AI impacts people.

Embrace Accountability: We deploy robust AI governance, including assessing and addressing potential harms and fitness for purpose, and ensuring human oversight and accountability. We are committed to learning from, and helping, others as AI best practices, norms and laws evolve.

Underlying these principles is our commitment to listen and learn about how AI can continue to be a tool to accelerate progress towards economic opportunity for all.

132. [Alibaba Cloud Unveils New AI Model to Support Enterprises' Intelligence Transformation](#)

Alibaba Cloud, the digital technology and intelligence backbone of Alibaba Group, today unveiled its latest large language model, Tongyi Qianwen. The new AI model will be integrated across Alibaba's various businesses to improve user experience in the near future. The company's customers and developers will have access to the model to create customised AI features in a cost-effective way.

Alibaba Cloud also announced lower cost options for key cloud products, including their Elastic Compute Service (ECS) and Object Storage Service (OSS), by introducing new ECS instances, OSS Reserved Capacity (OSS-RC) and OSS Anywhere Reserved Capacity (OSS-ARC). The move will make computing more accessible and affordable for companies looking to unlock emerging opportunities in the new AI era in China.

“We are at a technological watershed moment driven by generative AI and cloud computing, and businesses across all sectors have started to embrace intelligence transformation to stay ahead of the game,” said Daniel Zhang, Chairman and CEO of Alibaba Group and CEO of Alibaba Cloud Intelligence. “As a leading global cloud computing service provider, Alibaba Cloud is committed to making computing and AI services more accessible and inclusive for enterprises and developers, enabling them to uncover more insights, explore new business models for growth, and create more cutting-edge products and services for society.”

Integrating Tongyi Qianwen into Alibaba's businesses and building tailored models with customers

Tongyi Qianwen (通义千问 in Chinese) will be integrated into all business applications across Alibaba's ecosystem in the near future to further enhance user experience, from enterprise communication, intelligent voice assistance, e-commerce, search, to navigation and entertainment. With Chinese and English language capabilities, the model will first be deployed on DingTalk, Alibaba's digital collaboration workplace and application development platform, and Tmall Genie, a provider of IoT-enabled smart home appliances.

· Tongyi Qianwen-powered DingTalk is designed to make workplace communications more efficient. For example, it can summarize meeting notes, turn meeting conversations into text, write emails, and draft business proposals or promotion campaign plans through simple prompts. Users can instantly create a mini application on DingTalk by photographing a draft idea written on paper.

· Tongyi Qianwen-powered Tmall Genie will be able to engage in more dynamic and vivid conversations with users in China. For instance, it can develop and tell stories to children, provide healthy diet recipes, offer travel tips and recommend background music for a workout.

To further enable enterprises to reap the benefits of AI-driven innovation, Alibaba Cloud will offer its clients access to Tongyi Qianwen on thecloud and help them build customized large language models. By fine-tuning Tongyi Qianwen with customers' proprietary intelligence and industrial know-how in a secure cloud environment, enterprises can establish tailored AI models to suit their specific business needs. This is expected to spark a new wave of growth momentum for customers, eliminating the need for resource-intensive and expensive pre-training processes for building foundational models. Tongyi Qianwen is now available for general enterprise customers in China for beta testing.

In addition, developers will soon be able to access Alibaba Cloud's Tongyi Qianwen to create their AI applications at scale. This will further bolster the AI software ecosystem across sectors ranging from logistics to media, finance, manufacturing, energy, retail and more. Tongyi Qianwen as an API is also available for developers in China to apply for beta testing now.

Multimodal capabilities, including image understanding and text-to-image, will soon be added to the Tongyi Qianwen model to provide users with more compelling AI features.

“Generative AI powered by large language models is ushering in an unprecedented new phase. In this latest AI era, we can create additional value for our customers and broader communities through our resilient public cloud infrastructure and proven AI capabilities,” said Jingren Zhou, CTO of Alibaba Cloud Intelligence.

“We are witnessing a new paradigm of AI development where cloud and AI models play an essential role. By making this paradigm more inclusive, we hope to facilitate businesses from all industries with their intelligence transformation and, ultimately, help boost their business productivity, expand their expertise and capabilities while unlocking more exciting opportunities through innovations.”

Tongyi Qianwen is based on Tongyi, Alibaba's proprietary pre-trained model framework that unifies various AI models, including models that can turn text into images and short videos. Last year, Alibaba Cloud launched ModelScope, an open-source Model-as-a-Service (MaaS) platform with hundreds of AI models, including a Tongyi-based text-to-image model for global developers and researchers. So far, with over 1 million active users, ModelScope has made 800 models available with over 16 million model downloads to date.

More accessible and affordable computing for enterprises and students

Designed for small and medium-sized (SME) enterprises, the new ECS Universal instance family provides the same stability of its similar product, while saving costs of up to 40%. It is suitable for SMEs conducting web applications and websites, enterprise office applications and offline data analysis.

OSS-RC enables customers to reserve storage capacity in a specific region for one year. It reduces the capacity cost by up to 50% from pay-as-you-go prices. When customers have no requirement to store their data in a specific region, they can create an OSS “Anywhere Bucket” to store data in a region chosen by Alibaba Cloud. OSS-ARC can then reserve capacity for objects stored in OSS Anywhere Buckets. It reduces the capacity cost by up to 70% from pay-as-you-go prices.

To make computing resources more accessible to developers in China, Alibaba Cloud has also announced free trials of core products for up to three months, including ECS and PolarDB databases. Alibaba Cloud will also provide 1,000 free training courses on cloud technologies and around 500 hands-on experiments based on real business scenarios for developers to access cloud technologies easily.

In addition, Alibaba announced its Cloud for Youth program is partnering with UNESCO Chair on Artificial Intelligence in Education to bring more computing resources to students in China’s rural areas. Unveiled in 2021, Alibaba’s non-profit Cloud for Youth program helps to narrow the digital gap in China by providing cloud computers to schools in underdeveloped areas. The goal is to help youths strengthen their technical foundation in digital capabilities and cultivate local digital talents.

About Alibaba Cloud

Established in 2009, Alibaba Cloud (www.alibabacloud.com) is the digital technology and intelligence backbone of Alibaba Group. It offers a complete suite of cloud services to customers worldwide, including elastic computing, database, storage, network virtualization services, large-scale computing, security, management and application services, big data analytics, a machine learning platform and IoT services. Alibaba maintained its position as the third leading public cloud IaaS service provider globally since 2018, according to IDC. Alibaba is the world’s third leading and Asia Pacific’s leading IaaS provider by revenue in U.S. dollars since 2018, according to Gartner.

133. [Wechat AI privacy policy](#)

Introduction

We encourage WeChat users to report any potential violations of Community Guidelines to us via the in-app user reporting function on the WeChat app. Once we receive your user report, our content moderation team will review the user report to determine whether there has been a violation of these Community Guidelines. Please note that we will only take action against a reported user if we determine that there has been such a violation. If we determine that the reported user has not violated these Community Guidelines or if there is, in our view, insufficient evidence to prove that the reported user has committed such a violation, we will not take any actions against the reported user. In addition to human review, we also use artificial intelligence (“AI”) and other content moderation tools to assist us with the review of user reports and identification of violating content on the WeChat platform. Go to [Policy Enforcement](#) to see how we enforce our policy.

Policy Enforcement

We reserve the right to determine, at our sole discretion, whether content on the WeChat platform violates the Community Guidelines. If we determine that there has been a violation of the Community Guidelines, we may take any or all of the following steps against a violating user:

- (a) issue a warning regarding the user’s behaviour;
- (b) refrain from displaying or remove the relevant content relating to such breach (or reasonably suspected breach). Please note that if the relevant content has been received or viewed by a user (e.g. through a single/group chat or as a Moments post), we would not be able to hide or remove such content, as it would already be stored and on the user’s device cache, and the user should delete such content on his or her own device. However, we may restrict the further distribution or visibility of content in certain instances for users who have not already received or viewed the relevant content;
- (c) display a notice to recipients of the relevant content to take precaution due to a suspected or confirmed breach of these Community Guidelines;
- (d) restrict the user from using certain account functions or suspend or terminate the user’s account;
- (e) where we reasonably believe that the user has committed a crime or are otherwise required to do so under applicable laws, notify and cooperate with appropriate governmental and/or law enforcement authorities in the relevant jurisdiction.

We will consider a range of factors when determining whether and what actions to take against a reported user who has violated the community guidelines based on the information we have relating to each violation, including but not limited to:

- (a) the severity of the violation;
- (b) whether the violation was committed intentionally or otherwise;
- (c) the number of other users who have been adversely affected by the violation;
- (d) whether the violation amounted to unlawful conduct under applicable laws;
- (e) whether the user has committed the same or a similar violation in the past; and

(f) whether other users have lodged user reports against the same user for the same or a similar violation.

We will inform the reporting user of our decision whether or not to take action against a reported user once we have completed our review of the user report submitted by the said reporting user. If we decide to take any action against a reported user, the reported user will also be informed accordingly.

If you are: (i) a reported user whom we have actioned against or (ii) a reporting user who has made a user report but we have decided not to take any action against the user you have reported, but you disagree with our decision, please lodge an appeal to us by filling up the feedback form located at the [WeChat Help Center](#), and we will attend to your request as soon as possible.

134. [Spotify using AI](#)

Spotify uses artificial intelligence in a ton of smart ways to create an incredible listening experience across its audio streaming platform. This includes an AI DJ feature that curates a personalized selection of music for you based on your preferences, AI that [translates podcasts into different languages](#), AI-powered music and podcast recommendations, and AI-driven search capabilities.

(Maybe that's why Spotify is the world's most popular audio streaming service, with upwards of 574 million active users across more than 180 countries.)

Understanding how Spotify uses AI is valuable for a few reasons:

If you use Spotify, you may discover new uses for the platform...

Even if you don't use Spotify, it can help anyone who produces a podcast understand how their content is getting found on the platform...

And even if you don't have a podcast, the company is a sterling example of how important it is for any brand to build [AI Native and AI Emergent companies](#).

So, let's dive in.

How Does Spotify Use Artificial Intelligence?

Spotify uses AI in a handful of core ways that impact users.

Spotify AI DJ

The most high-profile and popular AI feature in Spotify is AI DJ.

Spotify's AI DJ is an AI-powered disc jockey that will choose what to play for you based on your specific music tastes and listening behavior. The AI DJ curates tracks for you based on your individual user data, then narrates its selections in a hyper-realistic voice created by generative AI.

AI DJ will switch up songs and vibes based on your real-time feedback (just hit the DJ button and it'll change it up), and it can surface music you haven't listened to in awhile or new selections based on what it thinks you'll like.

Discover Weekly

Spotify's Discover Weekly is a series of custom-made AI playlists, uniquely crafted each Monday for every user by the platform's AI algorithms.

Each personalized playlist is a compilation of 30 songs, carefully chosen to align with each user's specific listening preferences. It's designed to introduce listeners to new tunes by considering various factors, such as their streaming history, songs they've added to their playlists, and their likes and dislikes.

This feature has gained widespread popularity as a means for Spotify users to unearth new music, offering a gateway to explore unfamiliar artists and genres.

Spotify Wrapped

A popular seasonal use of AI at Spotify is the company's yearly Spotify Wrapped feature. At the end of each year, Spotify users can access Spotify Wrapped which is a personalized summary of their listening patterns throughout the year. It highlights your most frequently played artists, songs, albums, and podcasts, as well as stats on total listening minutes and favorite genres. Spotify will even curate a playlist of your top 100 tracks in the last year.

AI-Powered Recommendations

Spotify's AI models recommend music, podcasts, playlists, and other content to users.

To do that, Spotify's AI models use data on your behavior and preferences to predict what you might want to listen to next. That data includes what you listen to, how long you listen to it, what playlists you create, and much, much more. These AI-powered recommendations are served up in various areas on Spotify's Home screen, such as the "Shows you might like" section, which recommends new podcasts based on your interests.

Spotify leans heavily on reinforcement learning, a type of machine learning model that uses signals to optimize toward a goal. While Spotify doesn't reveal the secret sauce behind its AI, it likely optimizes recommendations towards a range of user-centric metrics, like increased likes or saves of tracks and increased user engagement with the platform. Basically, Spotify's AI is engineered to get you to come back to listen more and more often.

In this way, Spotify's AI-powered recommendations are the company's competitive advantage. Spotify doesn't have a monopoly on music streaming. While it does own the exclusive rights to some podcasts, you can typically find your favorite music, podcasts, and audiobooks on other platforms. What Spotify does have that's unique is a superior way to surface the right audio at the right time for you specifically.

This ability to hyper-personalize audio recommendations to each and every Spotify user is impossible without AI. This means, in a very real sense, Spotify as a business today would not exist at its current scale without AI. According to the company, at least [half a trillion events are processed daily](#) to inform machine learning models. And the more data these models gather, the better they are at making higher-quality recommendations.

AI-Powered “Daylists”

Spotify has also now launched an innovative feature called "daylists," offering users three unique, algorithmically-generated playlists daily, each with a quirky and ultra-specific title.

These titles, ranging from "Midwest Emo Flannel Tuesday Early Morning" to "Witchy Ethereal Tuesday," have sparked considerable amusement on social media, enhancing the service's popularity since its introduction. The titles, created by AI, are based on thousands of descriptors related to genre, mood, and themes, and are the brainchild of a team comprising data scientists and music experts at Spotify.

Molly Holder, Spotify's Senior Product Director, describes these playlists as "hyper-personalized, dynamic, and playful," aiming to reflect users' unique audio identities, [according to The New York Times](#).

The daylists align with Spotify's strategy of hyper-specificity, resonating with 80% of its users who appreciate the platform's personalized offerings. Notably, users have expressed both amusement and bemusement at the titles, often sharing them on social media for their uniqueness and sometimes bizarre relevance to their personal tastes. This innovative approach to playlist naming appears to be a modern twist on the classic mixtape, offering a new way for users to engage with and share their music.

Podcast Voice Translation

In 2023, Spotify announced Voice Translation for podcasts, an AI-powered feature, which translates podcasts into different languages—all in the podcast host's original voice. The tool uses OpenAI technology to match the AI-generated voice to the speaker's individual tone and style automatically. This means a podcast host can record an episode in English, then translate it into other languages in their own voice. Currently, the feature is being piloted with popular podcasters like Lex Fridman and Bill Simmons, with plans to expand access to these AI-powered capabilities over time.

Natural Language Search

Spotify uses artificial intelligence to power natural language search.

Previously, Spotify used exact words typed into a search bar to match content to queries. This approach was better than nothing, but it was limited: it didn't always provide high-quality results because it could only match terms very close to those used in a song, album, or podcast title.

Natural language search is different. Using AI technologies like natural language processing (NLP) and deep learning, natural language search understands the semantic correlation between words, so it doesn't need to exactly match your search with the words in a title to find what you're looking for. That's because natural language search can understand synonyms for different words, paraphrasing, and any content that means the same thing as what you searched.

This AI-powered feature is critical to navigating the platform, allowing you to quickly and easily find music, podcasts, and audiobooks—even if your search doesn't match the exact keywords in the title of the audio.

Spotify's Artificial Intelligence Investments and Acquisitions

It's no surprise, then, that Spotify has acquired AI companies, or companies related to AI, at a steady clip for almost a decade.

In 2013, Spotify acquired Tunigo to power better music recommendation algorithms.

In 2014, the company acquired Echo Nest, a music intelligence company that Spotify used to improve recommendations.

In 2015, Spotify acquired data science company Seed Scientific.

In 2017, Sonalytic was acquired by Spotify. Sonalytic uses machine learning to detect audio and recommend music.

Also, in 2017, Spotify acquired Niland, an AI startup, to optimize music searches and recommendations.

In 2018, Spotify started a regular event called Machine Learning Day, which brings together company researchers to discuss core topics in AI.

In its most recent AI-related acquisition, Spotify acquired Sonantic, an AI-powered text-to-speech generator. The acquisition was announced in 2022. One of the first applications of Sonantic is in the company's AI DJ feature, which provides AI-generated commentary for each user's AI-generated playlist.

135. [Skype Translator AI policy](#)

[Unlock now](#)

When I use translation on Skype, is my conversation content collected and how is it used?

When you use Skype's translation features, Skype collects and uses your conversation to provide the translation service. Voice conversations are only recorded when translation features are selected by a user. As you speak, we collect and process the audio to auto-detect the language you are speaking and use voice-to-text processing to transcribe your words. Then, we translate that written transcription.

With your permission, your data may be used to help improve Microsoft products and services. To help the translation and speech recognition technology learn and grow, sentences and automatic transcripts are analyzed and any corrections are entered into our system, to build more performant services. This may include transcription of audio recordings by Microsoft employees and vendors, subject to procedures designed to protect users' privacy, including taking steps to de-identify data, requiring non-disclosure agreements with vendors and their employees, and requiring that vendors meet the high privacy standards set out in European law and elsewhere.

Unless you separately consent to TruVoice or choose to contribute your voice clips for Skype translator improvement, the audio we collect for this feature is used only as described above, and all audio is deleted by the end of your call.

How do I turn translation off?

To stop translation during a call:

Tap or click the translation button.

Select Stop translating .

Translation will be disabled and a notification will be sent to the chat.

To turn translations off from Skype Settings:

In Skype, select Settings .

Select Privacy .

Select Translation and language auto-detection .

Select Disable . Translation and language auto-detection will be disabled.

Help us improve Skype Translator

How to enable Translation and language auto-detection?

Auto-detection of the translated language detects the spoken language and translates automatically.

In Skype, select Settings

Select Privacy .

Select Translation and language auto-detection to enable or disable this feature.

What is Truvoice AI?

Truvoice AI uses your voice to deliver the translation you have opted into, for everything you say in real-time for a more natural conversation. Truvoice AI can be enabled or disabled in Skype at any time:

In Skype, select Settings .

Select Privacy .

Select Truvoice AI to enable or disable the feature.

Note : To enable or disable Truvoice AI, Translation and language auto-detection needs to be enabled.

To turn on translation with Truvoice while on a call:

Select More to open additional options.

Select Translate .

Truivioce translation opt-in notification will be sent to the participant on the call

Note : To turn off translation with Truivioce while on a call, simply select More , and select Translate again.

Will my translation settings be synced across my devices?

Yes. When you make a change, your translation settings will automatically sync across your devices connected to your Microsoft account.

If I agree to allow the manual (human) review of voice data, can I change my permission?

Yes, you can change your permissions at any time by changing the toggle in Translation settings to off.

In Skype, select Settings .

Select Privacy .

Select Voice Clip Contribution to enable or disable the feature.

Are my translated conversations encrypted?

Conversations using translation are encrypted in transit to and from Microsoft’s servers.

Does Skype plan to use my communications content to sell advertising?

No, Skype doesn’t use the information collected through translation features to sell advertising.

136. [Improving user experience and boost sales with AI](#)

As consumers seek out simple, intuitive online shopping experiences, [Mercado Libre](#) is seeing its artificial intelligence (AI) efforts to improve the user journey pay off.

The Latin American eCommerce platform shared in its fourth quarter 2023 [financial results](#), reported Thursday (Feb. 22) that, throughout the fiscal year, the number of items sold rose by 22% year over year. Plus, unique active users grew by a whopping 47%, and gross merchandise volume rose 30%. These increases came as the company improved the digital buying experience in an effort to drive conversion.

“In 2023, we considerably improved the navigation in fashion, apparel and sports, with standardized filters across brand sellers,” [Marcos Galperin](#), the company’s founder and CEO, told analysts on a call. “This enables consumers to find what they need more quickly on the product pages. Users can also see the ‘more like this’ section to find similar items or products that you’ve clicked on, rather than simply going back to the search results. This feature is powered by artificial intelligence.”

He added that AI is also powering additional consumer-facing features such as product review summaries, product information summaries and personalized notifications about items left in carts. The company is also using AI to offer sellers pricing tools and pre-filled responses to common customer questions.

Indeed, if U.S. consumers are any indication, easy-to-use digital platforms can be key to customer acquisition and retention. The PYMNTS Intelligence study “[The Online Features Driving Consumers to Shop With Brands, Retailers or Marketplaces](#),” which drew from a census-balanced survey of more than 3,500 U.S. consumers, found that 40% consider how easy a given online store is to navigate when deciding where to shop.

“We continue to look at the specific needs of each vertical to improve the user experience because we believe this will drive offline consumption online,” Galperin said.

Notably, around the world, pure-play eCommerce has taken a slight dip in recent years from its pandemic peak.

The recent PYMNTS Intelligence study “[2024 Global Digital Shopping Index: The Rise of the Click-and-Mortar™ Shopper and What It Means for Merchants](#),” commissioned by [Visa Acceptance Solutions](#), which drew from a survey of nearly 14,000 consumers across seven countries, found that 29% of consumers surveyed are remote shoppers, using online channels exclusively. This share is down from 34% in 2020.

Granted, younger consumers continue to disproportionately shop remotely via eCommerce channels. The study found that that share rises to 32% for Generation Z and 31% for millennials. Plus, higher income consumers are more likely to make purchases in this way, with remote shoppers representing 34% of shoppers in this income bracket.

Overall, it seems that Mercado Libre’s strategic focus on enhancing the user journey through AI may be paying off, as evidenced by its strong growth in consumer adoption throughout fiscal 2023.

By prioritizing simplicity and intuitiveness in its online shopping experience, it appears the Latin American eCommerce platform has successfully attracted and retained a growing number of active users, leading to substantial increases in items sold and gross merchandise volume.

[137. The ITU recognizes the Carlos Slim Foundation and América Móvil for their technological innovation in health care](#)

The ITU recognizes the Carlos Slim Foundation and América Móvil for their technological innovation in health care

Carlos Slim Helú received the WSIS award for the development of the digital platform Monitor FCS, from Houlin Zhao, Secretary General of the ITU.

Monitor FCS, developed for addressing the COVID-19 pandemic, has analyzed information on more than 50 million reports of symptoms, which made it possible to trace positive cases, help break the chain of infections and maintain safe spaces.

Mexico City, June 6, 2022. The International Telecommunications Union (ITU) granted América Móvil the World Summit on the Information Society Prize for the development and implementation, together with the Carlos Slim Foundation, of two apps for the monitoring, prevention, tracing and care of the population during the COVID-19 pandemic.

The WSIS prize granted in the category of e-Health to the app Monitor FCS, recognizes that the app facilitated caring for and monitoring the health of the employees of América Móvil, Carso Group, Carlos Slim Foundation and other companies, as well as their relatives.

Carlos Slim Helú received the prize from the Secretary General of the ITU, Houlin Zhao, given his participation as Co-President of the Broadband Commission of the Union, before the plenary of the commissioners and the President of Ruanda, Paul Kagame, which held the organization's annual spring meeting in Kigali, under the title "Promoting the inclusive digital transformation".

The Honorary and Lifetime President of América Móvil pointed out that one of the priorities of the Group is health care and the wellbeing of workers, which is why the platform Monitor FCS was developed, to which around 500 thousand people were registered, which generated more than 50 million reports of symptoms that were analyzed to determine if a person was exposed to risks or if it was necessary to isolate possible contacts early and thereby keep workplaces safe, protecting each employee.

Mr. Slim Helú added that the platform, developed by Arturo Elias Slim, prevented around 85 thousand infections, and made it possible to implement efficient work protocols to substantially reduce the risks, thanks to which the rate of infections among the employees of América Móvil and other companies of the Carso Group was considerably lower than the national and local averages.

"Monitor FCS is a good example of the fact that the use of technologies helps to improve people's health and health care", concluded the also Co-President of the ITU Broadband Commission.

In mid-March 2020, faced with the pandemic caused by COVID-19, América Móvil, in coordination with the Carlos Slim Foundation and Claro Shop, a company of the Carso Group, developed in less than two weeks the digital platform Monitor FCS, a mobile and web app that can trace in real time and individually the state of health of employees and their relatives, facilitating a transparent, reliable and automated flow of information that is used to their benefit.

Through Monitor FCS, there has been daily monitoring in real time of the state of health of employees, their relatives and collaborators of América Móvil and Carso Group in Latin America, as well as the public in general with the COVID-19MX app.

With the use of the app, it was possible to detect more than 21 thousand cases, and take immediate actions such as isolation, contact tracing and adherence to the rest of the prevention and control measures in the COVID-Carso Protocol in the companies of the Group, which helped to avoid, in addition to some 80 thousand infections, 7 thousand hospitalizations and around 3 thousand deaths.

The app has incorporated artificial intelligence models for the detection of probable cases of COVID-19, simplified health status reporting processes and facilitated integration with platforms that support work health management like MIDO that are able to determine and monitor chronic illnesses such as obesity, diabetes and hypertension and like the app Mi Salud Integral which assists in the adoption of healthy habits.

Fundamentally, the app complies with all privacy protocols and ensures that individual information remains secure.

Simultaneously, through América Móvil and its subsidiaries Claro and Telcel, agreements were reached with health authorities of different Latin American countries, through which apps similar

to Monitor FCS could be developed, like COVID-19MX, to collaborate in the actions of prevention, containment and care of the general population during the health emergency. In this way, the authorities were able to better identify the chains of infection.

The WSIS prize granted by the ITU recognizes the contribution of América Móvil and of the Carlos Slim Foundation to developing mobile apps that bring health services closer to people, wherever they may be, facilitating diagnosis, medical care and epidemiological oversight.

138. [Accel's AI Investments Keep The Focus On Applications And Tooling](#)

This article is part of our series of profiles that spotlight an investor firm's AI strategy, including a list of its [AI portfolio](#). In a previous interview, we talked to [Sameer Dholakia](#) from [Bessemer Venture Partners](#), who predicted a [fast adoption curve of AI](#) through APIs.

With 40 years of investing under its belt, global venture capital firm [Accel](#) has long seen the potential of artificial intelligence. Now the firm is making fresh bets in AI startups.

The power of AI unleashed by large language models like [ChatGPT](#) has led to significant investor interest in applying AI to everything from chips to data storage and AI infrastructure, as well as tooling and applications built on the technology.

We spoke with Accel partner [Daniel Levine](#) about the firm's AI investment outlook.

The firm is making investments in AI across its team in India, London and the U.S., as well as its growth team. Levine likens it to investing in software, where the responsibility does not sit with one team or person but is distributed. While not every investment is necessarily in an AI company, AI is key to the firm's strategy. Accel is unlikely to invest in chips or data centers, said Levine. But the tooling and applications side of the technology is in its wheelhouse.

“You'll see new companies for which AI makes the difference between the product being so-so and potentially [being] a game changer in its category,” said Levine.

For many software companies, that poses a significant opportunity and threat. This technology can propel a company forward, but can also leave a company trailing as competitors take advantage of the possibilities it presents.

Ground-floor investment

Levine led Accel's 2017 Series A funding in [Scale AI](#), a company which trains data for AI capabilities. Scale has raised close to \$600 million since then, from its Series B through Series E, which were led, respectively, by [Index Ventures](#), [Founders Fund](#), [Tiger Global](#), [Dragoneer](#) and [Greenoaks](#).

Co-founded by [Alexandr Wang](#) and [Lucy Guo](#), Scale AI started out in this generation's equivalent of a garage — the basement of investor Levine's San Francisco home. The company hired thousands of contractors to annotate pictures for self-driving technology companies which today include [Waymo](#), [Lyft](#) and [Toyota](#). It has since expanded to natural language training as well as computer vision processing, supporting companies such as [OpenAI](#), [Pinterest](#) and [Airbnb](#).

Levine understood from his early days at [Crunchbase](#) — he was a colleague of ours who joined straight out of [Yale](#) — that having people looking at data under the hood is a necessary part of the process.

Application

“We’ll always play at the application level,” with the goal to make users more productive, said Levine.

Accel led the 2020 Series B funding in Toronto-based [Ada](#), an application layer customer service chatbot that utilizes AI.

“We could assume that over time, AI can make support agents more efficient,” said Levine. These tools balance when a human or an algorithm is involved to provide a better service. “There’ll still be cases when you’re going to want to talk to a person either on chat or phone. But there are definitely a lot of cases where you want to talk to an algorithm because it’s faster, it’s more convenient and it’s consistent,” he said.

Levine referenced project management software [Notion](#) — not an Accel portfolio company — several times in our conversation. “Notion AI is a very important product for them,” he said. Notion hosts wikis, docs and projects for companies, and has launched AI tools to help with writing, summarizing and planning, to make users more effective.

Tooling

Tooling and infrastructure companies are a core AI investment focus for Accel. These are the companies that assist other companies with their tech products. One of its portfolio companies, [AssemblyAI](#), for example, provides infrastructure around understanding audio.

Accel also announced this week it led a [Series C funding](#) in London-based generative video company [Synthesia](#), which makes video production possible for companies without actors, cameras or studios.

Another area of interest for Levine and Accel are new database products for understanding bias or trust and safety around AI, what the model is doing, and how it drifts.

The companies that comprise Accel’s AI portfolio span more than a decade and are not only represented by the new wave of companies. The [companies listed here](#) were founded as early as 2011 and the most recent in 2021. Levine’s investments in companies that predate AI but have since integrated these capabilities include [Sentry](#), an error-monitoring tool for software teams, and visual workplace collaboration platform [Whimsical](#).

“You’ll see a lot of companies that in hindsight will look like they’ve replaced existing software players,” he said.

Levine has also led Accel’s investments in, and serves on the boards of [EdgeDB](#), [Gem](#), [Mux](#), [ReadMe](#), [Scale](#), [Sentry](#), [Sprig](#), [Vercel](#) and [Whimsical](#).

139. MTN SA introduces Siya as it intensifies its AI Strategy in a bid to boost efficiency and revenue

MTN South Africa is intensifying its artificial intelligence (AI) strategy to boost efficiency, enhance revenues, and improve both customer and employee experiences.

The company has implemented AI solutions in multiple business operations such as customer value management, network operations, and customer service. These implementations aim to refine user experience and reduce expenses.

In line with the current era marked by data-driven strategies and digital transformation, the company's vision is to become an API- and AI-led entity to promote a culture of AI adoption within South Africa.

The anticipation for the upcoming year to be a significant one for AI is high, as many companies are expected to integrate their AI applications across different business sections, as projected by global research firm Omdia.

MTN SA's CEO, Charles Molapisi, believes that leveraging the mobile network operator's data to its fullest extent can unveil new sources of revenue and enhance margins through intelligent automation.

By harnessing the power of AI and APIs, we are not only future-proofing our operations, but ensuring our customers can look forward to a more streamlined, efficient and data-driven experience.

Technologies incorporated throughout MTN SA's operations encompass machine learning, digital assistants, and robotic process automation. Furthermore, the company provides access to AI APIs, empowering developers to integrate AI functionalities into their applications.

Bloomberg Intelligence suggests that the surging demand for generative AI and AI services could potentially expand the market from \$40 billion to a staggering \$1.3 trillion over the coming decade.

MTN's CEO, Molapisi, emphasized that the company's AI strategy is an extension of the programs earlier rolled out across its operations.

In the last year, the company has upgraded its call centers throughout Africa, infusing cloud-based AI and machine learning capabilities to elevate the customer experience.

The telecommunications company also plans to provide AI-as-a-service and conceptualize AI solutions that align with core business offerings and address enterprise requirements.

As a preliminary step, MTN launched SiYa, its internal AI-driven chatbot designed to assist employees. SiYa aids in handling inquiries, providing information about company policies, and sharing insights from MTN's knowledge base.

The company articulates that the insights derived from SiYa's interactions will be crucial in shaping the future of customer engagement at MTN.

"SiYa's growth doesn't stop with employees; he evolves in tandem with the learning and development of the chatbot. This progression will eventually enable SiYa to guide customers in

making device purchases and seamlessly collaborate with human advisors, marking a significant departure from conventional processes,” concludes Molapisi.

140. [AI regulation is about finding the right balance](#)

AI regulation: it’s about finding the right balance

AI regulation is a government, industry, regulator, company and private individual issue – and it must be addressed collaboratively

How to regulate AI and to build AI models responsibly is one of the top business concerns for 2023 – and it will surely rank highly going forward. Governments worldwide (and private individuals) are also considering how and when to respond to the march of AI (on top of all the macro crises the world is enduring).

It is fair to say that AI regulation is on all our radars. That is what prompted WPP and BCW to host a forum that explored the future of AI regulation.

WPP is ahead of the curve. It has been investing in AI for the few years because AI is, as WPP CTO Stephan Pretorius calls it, “a transformation technology when applied to marketing and advertising”. He calls the pace of innovation over the last year “radical” – impact of AI on client work, business outcomes, the industry and society has become front and centre. There is no compromise in terms of values and integrity.

WPP’s AI company, Satalia, is at the core of innovation and has enabled WPP to push beyond just applying AI tools to be at the forefront of discovery. Importantly, WPP’s AI expertise the building of explain-ability into its use of AI tools.

BCW’s own experience in building tools, such as [Decipher, with its partner Limbik](#), and supporting clients on articulating policy and external communications perspectives through its Navigate team means that they too are at the forefront of work in this area.

The UK Government is taking a lead

Given the high penetration of AI expertise in the UK, the UK Government is in pole position to be a leader. Alexandra Leonidou, Head of Regulation and Governance at the UK Office for AI says that the UK Government has recognised the profound effect of AI globally.

She talks of its impact on public services like healthcare and education – not only its impact on marketing and advertising. While she identifies the risks – and they are profound (AI-enabled cyber-attacks is about finding the right balance) – she outlines that regulation is about finding the right balance.

In March 2023, the UK Government published its AI White Paper – [AI regulation: a pro-innovation approach](#) – which had six core characteristics at its heart: pro innovation, proportionality, trustworthiness, adaptability, clarity and collaboration. It has taken both a principles-led and context-led approach to regulation, and it expects, says Leonidou, to lean on existing regulators to oversee agreed principles.

The UK Government plans to start on its regulatory journey with a non-statutory approach, says Leonidou. The Government has consulted extensively – with 400 businesses and individuals, including WPP – and already established the central risk function in government.

Stealing the headlines has been the [AI Safety Summit](#) and the discussion paper launched just before the summit: [Frontier AI: capabilities and risks](#). Funding for a [digital and AI advisory service](#) has also been secured. The outcome of the AI summit – with its roster of around 150 high-profile attendees from around the world – has been well publicised: to build a shared understanding of frontier risks, to establish a forward process, to agree appropriate measures, to identify measures for AI safety research, and to showcase how safe AI will enable AI for good globally.

Leonidou calls the [Bletchley Declaration](#), published at the end of the summit, “ground-breaking”. A total of 28 countries, including China, signed this declaration, thereby agreeing to seize the opportunity of AI for peace and wellbeing, to affirm that all actors have a role to play, and to consider a proportionate and pro innovation approach to governing AI. [The Emerging Processes document](#) will help ensure conversations and collaboration continue to flow.

What is more, the [AI Safety Institute](#) has been launched to carry out AI research and build models. This organisation will support technical standard development in partnership with other jurisdictions – partnerships with Singapore and the US have already been inked.

Where are we at?

There are so many ways to think about AI but, at WPP, Chief AI Officer Daniel Hulme has a very clear train of thought. He points to the [six applications of AI](#) which helps us navigate governance, one application at a time.

He also points to the AI impact pyramid with disruption at its apex (where AI disrupts the commercial and operating model), production and services occupying the layer beneath that (with their AI embedded tools and processes), and a core productivity base supporting everything (with its AI embedded core productivity tools and back office).

But when we think about the risks associated with AI, Hulme refers to [micro risks, malicious risks and macro risks](#) in society, and the importance of distinguishing between these three risks. But, in the final analysis, says Hulme, there’s a series of important questions to consider in relation to how AI is used and the extent to which it should be regulated:

1. Is the intent appropriate? AIs don’t have intent but humans do.
2. Are the algorithms deployed opaque or transparent? There needs to be explain-ability.
3. What harm could an AI cause?

WPP is proud to have developed a set of principles, guidance, and legal advice, which underpin our internal generative AI platforms and tools and help our people and clients understand AI responsibility. These include WPP AI Policy and WPP Data & AI Ethics Principles and Guidelines, and specifically covering generative AI – Generative AI Principles.

Broadening the debate

From a wider perspective, what is becoming clear is that there is no real common understanding of the responsible use of AI. Yves Schwarzbart, Industry Relations Manager at Google UK and

Co-chair of the ASA’s AI Taskforce, called for collaboration and coordination throughout the advertising and marketing industry.

Jesse Shemen, CEO and co-founder of Papercup – an AI translation company – talked about quality control in the use of AI tools and agreed there is no common understanding of the responsible use of AI (which is why a principles-based approach is the right one). Hulme concurred that there is no commonality of understanding of risk which is why WPP undertakes significant engagement with clients to help them understand training models, biases and risks associated with copyright violation.

In spite of the dearth of common understanding, Leonidou pointed out that we are already seeing emerging initiatives – such as the [White House Executive Order](#) – take similar approaches to each other. This is exactly what is needed if we are to avoid barriers to trading across borders.

Perhaps this is at the crux of AI regulation: how do you build a common understanding of the challenges business faces while also understanding the risks and not limiting the scope for businesses to reap the rewards? And how do we make sure companies that adopt AI technologies are not penalised by regulation compared with their early-mover peers?

141. [Omnicom first mover access to AI insights](#)

With Omni Assist, Omnicom Leverages First-Mover Access to Open AI to Accelerate the Timeline from Insights to Outcomes

Reveal Marks the Launch of Omni 3.0, Powered by Generative AI

CANNES, France, June 19, 2023 — Omnicom (NYSE: [OMC](#)) today unveiled Omni Assist, the inaugural Generative AI capability enabled by a [first-mover partnership with Microsoft](#). Omnicom is the first agency holding company to have enterprise access to the latest Open AI GPT models.

Omni Assist is a virtual assistant providing insights, notifications, and recommendations across every step of the workflow of the Omni open operating system, from audience development to planning, activation, measurement, and optimization. Expected to reduce discovery from days to minutes, and with the ability to enhance communications across agency and client teams, Omni Assist will accelerate the timeline from insights to client outcomes.

In addition to accelerating campaign time-to-market, Omni Assist delivers on the primary promise of Generative AI as outlined by Omnicom CEO John Wren: improving workflow in a way that enables Omnicom’s knowledge workers to be more productive – and its agencies to add more value – in the marketplace.

“We’re embracing Generative AI as quickly as possible to enhance the capabilities of our best and brightest people, and deliver better outcomes for our clients,” said Wren.

Revealed during a Cannes Lions event celebrating Omni’s fifth anniversary, Omni Assist is part of launch of Omni 3.0, the next generation of Omni where every experience is powered by Generative AI.

Launching the Next Generation of AI Powered Innovation

AI technology and techniques – including computer vision, language modeling and facial recognition – have been core to Omni’s capabilities since [its launch in 2018](#) as the industry’s first people-based, precision marketing and insights platform, distinguished in the marketplace by its open architecture and dynamic federation of data partners.

Recognized by leading research and advisory company Forrester as the holding company platform with the deepest integration across its network, Omni launched its second generation in April 2021, with an enhanced user experience designed to expand access to more users across Omnicom agencies. Omni 2.0 also saw the launch of healthcare and PR verticals; data collaborations and/or integrations with [Affinity](#), [Amazon](#), [Google](#), [Infosum](#), [LG](#), [Teads](#) and [Yahoo](#); clean room partnerships with [AWS](#), [Disney](#), [NBCU](#) and [TelevisaUnivision](#); and retail media partnerships with [Albertson’s Media Collective](#), [Instacart](#), [Krogers](#) and [Walmart Connect](#).

With Omni 3.0, Omnicom has deployed Microsoft Azure Cognitive Services to build its most powerful capabilities yet for its agency teams and clients, delivering benefits such as real-time conversational enablement for all Omni applications; automated audience intelligence that surfaces hard to identify audience behaviors; and performance intelligence that summarizes key trends and identifies drivers of performance with optimization recommendations.

“When we launched Omni in 2018, we described its mission as the democratization of data – a mission that we’ve met with more than 17,000 Omni trained and certified users across the holding company, and Omni integrations into agency-level planning processes across the network,” said Annalect CEO Slavi Samardzija. “With Omni 3.0 – powered by Omni Assist – we are going beyond the democratization of data, to the democratization of insights.”

“Most recently, I have had the privilege of working with Omnicom on their transformation efforts, leveraging Microsoft Azure Open AI to power Omni 3.0. We are at the heart of Omni Assist, a virtual assistant providing insights, notifications, and recommendations the Omni workflow, from audience development to planning, activation, measurement, and optimization. This platform is evolving quickly and is unique to anything I’ve seen in the industry,” commented Simon Crownshaw, Director of Media & Entertainment, Microsoft.

In addition to Omni Assist, Omni 3.0 launch capabilities will also include Omni Commerce, which was [launched earlier today](#) in Cannes. Omni Commerce, the industry’s first connected commerce orchestration solution, enables Omnicom to maximize brand awareness and increase the effectiveness of its clients’ retail media investments, driving product sales and profitability.

About Omnicom Group Inc. Omnicom Group (www.omnicomgroup.com) is a leading global marketing and corporate communications company. Omnicom’s branded networks and numerous specialty firms offer services in advertising, strategic media planning and buying, precision marketing, commerce and brand consulting, experiential, customer relationship marketing (CRM), public relations, healthcare marketing and other specialty communications services to over 5,000 clients in more than 70 countries.

142. [Dentsu AI innovations](#)

Dentsu Teams Up with AWS to Further Scale GenAI Innovation for Brands

Published on: 23rd January 2024

Rounds out Generative AI stack with adoption of Amazon Bedrock and Amazon SageMaker

Dentsu today announced it has extended its relationship with Amazon Web Services (AWS) by adopting two key services to further scale its use of generative artificial intelligence (GenAI), driving new levels of innovation and opportunity for clients. Amazon Bedrock and Amazon SageMaker add new, differentiated technologies to dentsu's full enterprise-grade, GenAI stack. Dentsu's AI strategy, to provide safe and pervasive use of tools across the global business for the development of both client-ready products and operational innovations, is already yielding impactful results. With AI-driven client campaigns already in the field and the widespread adoption of AI-powered tools to boost workflows, drive efficiency and unleash creativity, dentsu is driving real, responsible results.

Implementing GenAI will allow dentsu to help its team of over 72,000 employees globally to innovate faster. Using Amazon Bedrock and Amazon SageMaker will help dentsu to more easily and more quickly deploy third-party and open source models across its product and engineering teams. This gives dentsu employees access to a vast range of cutting-edge technologies from the external global technology community. Amazon Bedrock is a fully managed service that offers a choice of high-performing foundation models from leading AI companies via a single API, along with a broad set of capabilities for building GenAI applications which meet dentsu's high standards for security, privacy, and responsible AI. Meanwhile, Amazon SageMaker enables dentsu's data scientists and developers to build, train, and deploy machine-learning models on any scale, quickly and easily. It includes modules that can be used together or independently to build, train and deploy models. The result is game-changing levels of access to platforms that give dentsu's client teams the ability to quickly innovate and prototype at scale, creating new products and services to drive client outcomes. It also provides dentsu access to best-in-class capabilities for deploying AWS proprietary models such as Amazon Titan, which provides a breadth of high-performing image, multimodal, and text model choice.

The use of these new services within dentsu has been pioneered by Dentsu Digital, Japan, during a private preview programme with AWS. The team has worked in close collaboration with dentsu colleagues around the world to quickly upskill and support, as well as apply GenAI to prototypes.

Saturo Yamamoto, Dentsu Digital Inc. Executive Officer in charge of AI, commented, "Dentsu has been developing multiple AI solutions on AWS, and we continue this tradition with our latest advanced customer experience enhancement service brand "∞AI (mugen AI)", some components of which also leverage AWS infrastructure. We have been actively evaluating methods to harness the potential of Amazon Bedrock immediately following its release, intending to integrate these AI capabilities into our service progressively. We eagerly anticipate continuing to contribute to our clients' growth and transformation through our products, as we have done so far."

"Generative AI is one of the most transformational technologies of our lifetime, significantly impacting productivity and creativity," said Atul Deo, General Manager, Amazon Bedrock. "Using Amazon Bedrock, dentsu established new ways of improving productivity that combine technology with the knowledge of local teams. For example, dentsu is able to easily experiment

with and evaluate top foundational models for advertising use cases, privately customizing them with their own data securely. This opens up new opportunities for dentsu to become more efficient and cost-effective, whilst increasing team creativity. We look forward to growing our relationship with dentsu in these next years and supporting the development of generative AI-powered tools that enable customers to boost productivity and power innovation.”

Today’s announcement builds on news last year about dentsu’s deployment of a range of AI tools and services from [Microsoft](#), [Google](#), Salesforce and Adobe.

About dentsu
Dentsu is the network designed for what’s next, helping clients predict and plan for disruptive future opportunities in the sustainable economy. Taking a people-centered approach to business transformation, dentsu combines Japanese innovation with a diverse, global perspective to drive client growth and to shape society.

143. [Interview with the CFO on artificial intelligence](#)

Please tell us your basic approach to investment.

A.At the Hakuodo DY Group, we view investments as strategic expenses for strengthening our business foundation, including the expansion of human resources well-versed in digital and other technologies. We also view investments such as mergers and acquisitions (M&A) as actions that directly impact the balance sheets. Strategic expenses are geared toward realizing organic growth over the medium to long term. In a sense, they function as the seeds, fertile soil, and water needed for growing our business. With the rapid progression of digitalization, it is crucial that we secure personnel who can implement digital marketing activities. It is also imperative that we increase the number of personnel well-versed in technologies to establish a foundation for future growth. Being able to respond to technologies such as artificial intelligence (AI) and extended reality (XR) is key. Furthermore, as we work to transform our business structure, we must reform our workstyles and establish a sustainable operating structure. The expenses we are currently investing serve as the cornerstone for steadily implementing such initiatives. However, these kinds of investments take a certain amount of time to produce results. As we are currently in the phase of foundation building, our expenditure on investments is greater than usual. We therefore expect that our profit growth will be much more gradual than it has been in the past. We will need to continue investment even after the conclusion of the current Medium-Term Business Plan. Once we have achieved a certain level of progress with establishing our business foundation, however, our basic approach will be to keep selling, general and administrative expenses within the range of gross profit growth and strive to steadily improve our operating margin.

In addition, to accelerate the speed of growth, we must incorporate external functions and capabilities through such methods as M&A and capital alliances. With regard to global business domains, in particular, gross profit from our overseas businesses accounts for over 20% of our total consolidated gross profit. Accordingly, we need to execute M&A in order to further enhance these businesses.

Moreover, domestically, we are considering M&A as an option for further enhancing our product lineups in digital, marketing execution, and other domains. We also recognize capital alliances as an effective means for bolstering our technological capabilities. I would like our investors to understand that we do not view M&A simply as a tool for expanding the scale of our business. Rather, the purpose of executing M&A is to augment our strengths in the areas in which we are lacking, enhance our product lineups, and enhance operating efficiency through the generation of synergies.

Q.You stated that, as a general rule, you aim to keep expenses within the range of gross profit growth. Could you please tell us your thoughts on investment discipline, including for capital expenditures and M&A?

A.Obviously, we aim for a return and profit that is commensurate with the amount we invest. As a basic policy, we aim for a return that exceeds the cost of capital. We recognize that the Group's current cost of capital stands at around 7%, and we determine hurdle rates for investment at major operating companies keeping this figure in mind. Also, in terms of investment limits, we believe that we should be able to cover investment and shareholder return amounts through cash flows generated by our operating activities. Timing is also an important element of investment, so we will not necessarily reject an investment if the amount exceeds cash flows generated by operating activities in the near term provided the investment meets certain criteria. In such instances, we will make use of funds procured from external sources and then aim to balance out the repayment of the investment amount over the medium to long term. In other words, we will always strive to maintain a balance of net cash over the medium to long term.

Q.Under the Medium-Term Business Plan, you are actively promoting investment in order to reinforce your business foundation. Aside from expenses that directly impact profits, to what degree are you planning to execute investment?

A.To explain our investment plans over the period of the Medium-Term Business Plan, which runs through fiscal 2023, if we consider our results for investments in fiscal 2021 and the outline for investments in fiscal 2022, and in the event that we achieve our targets for fiscal 2023 (the final year of the Medium-Term Business Plan), total earnings before interest, taxes, depreciation, and amortization (EBITDA) will come to approximately ¥240.0 billion. Furthermore, if we assume over the same period that the total payment of corporate income tax and dividend payments trend at the same level as in fiscal 2021, we should have around ¥100.0 billion remaining at the end of the plan. This amount serves as the basis of our estimations of the investment limit that I mentioned earlier. If we factor into this limit the sales of investment securities conducted in fiscal 2021, the future sale of Group-owned assets, and the balance of net cash at the time we revised our Medium-Term Management Plan, I believe that we will be able to make investments at amounts that exceed the limit while still maintaining a sound financial position. Meanwhile, in fiscal 2021, we invested approximately ¥10.0 billion in acquiring tangible and intangible assets. As we are aggressively investing in technologies and rethinking our office layouts, we will most likely invest greater amounts in acquiring such assets in the remaining two years of the plan. Also, we acquired SoldOut,Inc. via a takeover bid (TOB) in fiscal 2021, and we will continue to actively enhance our functions through M&A and capital alliances going forward. However, as

other parties are involved, I am unable to clarify exactly how much we will invest in such initiatives at this time. In conclusion, however, I am able to say that we plan to invest over ¥100.0 billion in building our business foundation over the three-year period of the plan and that we have enough financial capacity to do so.

Q.You mentioned that you will maintain a balance of net cash even after investing over ¥100.0 billion throughout the three-year period of the plan. How do you view the Group's current financial position?

A.Looking at our business cycle, we would like to maintain a balance of cash and cash equivalents totaling around one month's worth of billings. On average, we record billings of at least ¥100.0 billion a month, so we intend to raise funds with an awareness of that level. At the fiscal 2021 year-end, cash and time deposits stood at ¥183.9 billion, and interest-bearing debt was ¥126.4 billion, resulting in net cash of ¥57.5 billion. Interest-bearing debt of ¥100.0 billion remains from when we turned D.A.Consortium Inc. (DAC) into a wholly owned subsidiary in 2018. In terms of fundraising, we will make relevant decisions while considering our cash level as well as our investment plans. The financial market is undergoing significant changes, and we understand that we must diversify our fundraising activities as a result. At the end of fiscal 2020, which was directly before we revised our Medium-Term Business Plan, our balance of net cash amounted to ¥62.8 billion. As I mentioned previously, we expect expenditures to balance out during the period of the Medium-Term Business Plan, even with our strategic expenses and investment in M&A and other areas. To that end, we believe we can maintain financial soundness even if there are slight deviations to our investment plans or the timing of income and expenditures. In September 2022, we received an A+ credit rating from Rating and Investment Information, Inc. (R&I), demonstrating that rating institutions also believe that the Group is in a stable financial position.

Capital markets have suggested that the Group has too many cross-shareholdings.

A.That is correct; the issue has been brought to our attention. At the end of fiscal 2021, investment securities came to ¥136.6 billion. Not all of this amount constitutes cross-shareholdings, as it includes shares held in affiliates. However, the total of "special investment shares" disclosed in our fiscal 2021 annual report was ¥80.2 billion. I believe that the reason some investors have this perception is because this amount represents 22% of our equity.

Every year, we review the purpose and economic impact of our cross-shareholdings and gradually sell off those shares that we have no logical reason to retain. We understand that we are in an era in which there are strong demands for companies to reduce their cross-shareholdings, and we therefore intend to sell off our cross-shareholdings in a manner that does not inconvenience the investee companies, thereby enhancing our capital efficiency. Actually, over the past five years, we have sold off a total of ¥71.7 billion in investment securities, with ¥68.6 billion of this amount constituting sales of investment securities conducted over the past three years. I ask that our investors understand our approach to addressing this matter.

Please tell us your approach to shareholder returns.

A. Our basic policy is to provide stable dividend payments based on our desire to offer long-term economic benefits to our shareholders. Even with the temporary decline in profits amid the COVID-19 pandemic, we have continued to maintain and increase our dividend levels. Although we forecast a decline in net income in fiscal 2022, we intend to leave our dividend levels unchanged. We are also constantly examining buyback of our shares as a means to provide additional returns and enhance capital efficiency. I talked about how we aim to maintain a balance of net cash as an indicator of financial soundness, but I also feel that, in cases where we believe we have more than a sufficient amount of funds, we need to keep open the option of providing additional shareholder returns, even while taking various risks into consideration. We will examine whether or not we have sufficient funds to do so by, for example, observing the ratio of net cash to equity capital. That said, we will also seek to flexibly acquire our shares in accordance with changes in the operating environment. We will decide on whether to buy back shares not by looking at the level of cash and time deposits we are maintaining but rather based on a comprehensive consideration of factors such as our financial position, business performance, demand for funding, and trends in our share price.

In closing, from your position as CFO, is there anything you would like to convey to the readers?

A. Investments for future growth are indispensable. To that end, I believe my role as CFO is to help the Group build a financial foundation that underpins the cycle from investment to growth and ensure that this effort leads to the enhancement of corporate value. I ask for the continued support and encouragement of all of stakeholders as we strive toward this goal.

144. PUBLICIS IS PUTTING AI AT ITS CORE TO BECOME THE INDUSTRY'S FIRST INTELLIGENT SYSTEM

SIX YEARS AFTER SHIFTING FROM A HOLDING COMPANY TO A PLATFORM, PUBLICIS IS PUTTING AI AT ITS CORE TO BECOME THE INDUSTRY'S FIRST INTELLIGENT SYSTEM

After significantly outperforming its industry for the fourth year in a row, with organic growth of +6.3% in 2023, Publicis Groupe [Euronext Paris FR0000130577, CAC 40] today set out its strategy to become the industry's first AI-powered Intelligent System.

[Click here](#) to see the hour-long presentation by Arthur Sadoun, global CEO, Carla Serrano, global CSO, Nigel Vaz, CEO Publicis Sapient, Dave Penski, CEO Publicis Media & Sam Levine Archer, Chief Solutions Architect Publicis North America.

Presentation overview:

From a Platform to an Intelligent System Company

In the last 6 years, Publicis has truly become a partner in its clients' transformation. Through 3 strategic bets – putting data and technology at the center with the acquisition of Sapient and Epsilon, implementing a country model, and building a single operational backbone – it has shifted from a holding company to a platform.

That platform organization has allowed Publicis to outperform the market on both financial and extra-financial KPIs. But it also now uniquely positions the group to fully harness the power of AI, to become an Intelligent System company capable of connecting every data point, from across every expertise, business unit and geography, and putting them into the hands of all of its people.

In short, thanks to the shift to an Intelligent System company, everyone within Publicis will become a data analyst, an engineer, an intelligence partner, with all the information they need at their fingertips to supercharge client growth.

An ambition that is already a reality

Concretely, Publicis is infusing a layer of AI across its platform organization to connect its enterprise knowledge under one entity: CoreAI.

The group is building this unifying AI-led foundation in-house and across its full enterprise, thanks to Publicis Sapient's unrivalled AI expertise and partnerships, which span supporting Nvidia in designing networking chips for AI servers, to developing AI-powered digital consumer journeys across multiple industries.

Sitting at the center of the group, CoreAI unifies all of Publicis' proprietary data including the leading consumer data across 2.3 billion profiles of people around the world, with trillions of data points about content, media, and business performance, and almost a petabyte of assets on Marcel, all combined with 35 years of business transformation data and coding owned exclusively by Publicis Sapient.

CoreAI makes those trillions of data points shareable and accessible to everyone at Publicis, super powering them across 5 key disciplines:

Insight: Brilliant strategy, accurate analyses, and business consultant-level intelligence will power all marketing strategy and plans, transforming everyone into intelligence partners who architect client growth.

Media: Media planning, buying and optimization will deliver new levels of accuracy and outcomes positioning clients to win at commerce sooner and faster.

Creative + Production: Personalized content will finally be realized at scale, with efficiencies and highly relevant, desirable creative.

Software: The best software and digitally enabled products will be brought to market at scale in days and weeks not months.

Operations: Groupe operations and client management systems will be boosted with speed, accuracy and efficiency.

Publicis plans to invest three hundred million euros over the next three years as it becomes a true Intelligent System. For 2024 alone, the group anticipates an investment of one hundred million euros, with 50% on people, focused on upskilling, training and recruitment, and 50% on technology, through licenses, IT software and cloud infrastructure.

The group began engineering CoreAI in the second half of 2023 and plans to iteratively roll out capabilities in the first half of 2024. It will present MVPs at Viva Tech 2024 this upcoming May.

Arthur Sadoun, CEO & Chairman of Publicis Groupe commented: “Our journey from a holding company to a platform has not been easy, but it definitely paid off, as you can see with our 2023 organic growth outperforming the industry for the fourth year in a row. The platform organization we have built over the last decade, our proprietary data of unmatched breadth and accuracy, and the 45,000 engineers, consultants and data analysts at the heart of our model, uniquely position us to push the boundaries even further by leveraging AI.

Putting CoreAI at the heart of our organization and truly becoming an Intelligent System company will make our people more efficient and more productive. But way more importantly, it will allow everyone to do things tomorrow that no one can do today, guided by the highest ethical standards, and at the service of our clients’ growth.

As we enter our second century, we are confident that all of the efforts we have made to transform and the ongoing investment we are making in our people and technology will allow Publicis to continue to outperform its peers on organic growth, sustain the highest financial KPIs, and lead the change in our industry.”

About the financial impact of our AI Plan

The investment in AI of 100 million euros in 2024 will be fully funded by internal efficiencies. It will have no dilutive impact on Groupe’s Operating margin in 2024 and it will be slightly accretive on Operating margin in 2025.

About 2023 Preliminary Full Year and Fourth Quarter Net Revenue (non audited)

Publicis Groupe today pre-releases its Fourth Quarter and Full Year 2023 net revenue. Full details of the 2023 Audited Annual Results will be published on 8 February 2024, before the market opens.

Full year organic growth came in at +6.3%, above the +5.5% to +6% guidance range last upgraded in October.

This included a stronger than anticipated finish to the year, with +5.7% organic growth in the fourth quarter.

Media, one third of net revenue, grew by double digits organically on the year, accelerating in Q4 supported by a faster ramp up in new business. Data & tech activities, another third, were very solid on the year while seeing contrasting trends. Epsilon recorded circa +10% organic growth in 2023, further accelerating in H2 with double-digit growth in Q4, led by the rise in demand for first-party data. As anticipated, Publicis Sapient saw ongoing delays in digital business transformation projects, like all comparable IT consulting firms, posting +3% organic growth on the year despite a modest decline in Q4. Creative was again very resilient in both the full year and Q4, with low single-digit organic growth.

On a regional basis, the strength of our model was visible in all geographies in both the full year and in Q4.

The U.S., 60% of revenue, delivered a remarkable +5.0% organic growth for the year, accelerating to +6.1% in Q4. Europe organically grew at +10.3% in 2023, with Q4 at +4.3% despite high comparables, notably in the UK. Asia posted +2.9% organic growth on the year, accelerating to a very solid +4.0% in Q4 led by China returning to growth. Middle East and Africa grew organically

by +12.4% in the full year and +9.7% in Q4, and Latin America +8.9% in the full year and +13.9% in Q4.

Disclaimer

2023 numbers presented today are preliminary and non audited. Certain information contained in this document, other than historical information, may constitute forward-looking statements or unaudited financial forecasts. These forward-looking statements and forecasts are subject to risks and uncertainties that could cause actual results to differ materially from those projected. These forward-looking statements and forecasts are presented at the date of this document and, other than as required by applicable law, Publicis Groupe does not assume any obligation to update them to reflect new information or events or for any other reason. Publicis Groupe urges you to carefully consider the risk factors that may affect its business, as set out in the Universal Registration Document filed with the French Autorité des Marchés Financiers (AMF) and which is available on the website of Publicis Groupe (www.publicisgroupe.com), including an unfavorable economic climate, a highly competitive industry, risks associated with the confidentiality of personal data, the Groupe's business dependence on its management and employees, risks associated with mergers and acquisitions, risks of IT system failures and cybercrime, the possibility that our clients could seek to terminate their contracts with us on short notice, risks associated with the reorganization of the Groupe, risks of litigation, governmental, legal and arbitration proceedings, risks associated with the Groupe's financial rating and exposure to liquidity risks.

145. [AI makes its mark at Havas group](#)

The ways in which artificial intelligence will fuel agency growth are coming into sharper focus.

Havas Media Group is a prime example. AI, and the many derivatives of it, are already being deployed across the majority (over 90%) of the group.

For instance, machine learning tools are currently being used to catch anomalous budget inputs within social campaigns to flag them for second-level approval.

So if a campaign is extended by a month, but the extra budget has been erroneously applied to the final two days of the current month, the tool can flag this error and prevent a month's worth of budget being spent over a two-day period.

“It's sort of biddable operations,” said Mike Bregman, chief data officer at Havas Media Group. “We constantly have to think about the billions of dollars that we have in our treasury at any one time so the idea of using AI to help with that bookkeeping is key. We're able to use AI to help keep track of all of that at a real scale.”

Elsewhere, machine learning is also being used to recommend how much to spend on a given day based on a week or month level budget, as well as the seasonality and past spend patterns for that specific brand.

Both examples speak to the biggest benefit the agency has reaped from AI to date: speed and time savings — hours of human work reduced to minutes or seconds.

Take the aforementioned case of catching anomalous spending decisions, for example. Not only did it generate upwards of one million dollars a year in savings, according to Havas Media Group, it also freed up hours — time execs at the agency could spend working with clients or with one another.

“The agency model has to be futureproofed and in order to do that there are some fundamental changes to the way organizations are designed, the way they operate and the technology that helps them do that, which need to be addressed,” said Bregman. “AI has the ability to unlock all of that.”

Creative — or rather the way it is optimized — is another process AI has permeated through at Havas Media Group. Nowadays, any dynamic creative optimization-driven campaign deployed in and around the purchase funnel by the agency has AI in the background.

“These AI platforms can come up with different combinations of messages in a few seconds when it would take a copywriter a few days,” said Bregman.

Copywriters should breathe easy. Havas Media Group isn’t planning to replace them outright. Rather, it’s using AI to handle certain tasks.

As Bregman explained: “it’s still smart to have a human that’s reading all the iterations, because some of them might just be ridiculous or outside the norms.”

This is just the start.

Over the next two to three years, Havas Media Group wants AI more deeply embedded into the fabric of the agency. So not just using AI to optimize all media buys but also to create custom algorithms within a programmatic bidder or using the technology to identify the right training modules for a planner as well as making manual tasks like filling out timesheets.

Some of these efforts are already well underway, like for lower funnel performance optimization. Havas Media Group’s execs are using AI to power custom algorithms in the demand-side platforms — or ad tech used to place programmatic bids — to get 25%+ improvements in the cost per acquisition charged when the ads it buys lead to a conversion.

The application of AI is expanding to broader metrics like attention, where it’s used to model consumer interactions with ads — which is important as the industry moves toward attention-based planning.

Even from this limited vantage point it’s easy to see where this nets out in the short-to-medium term: campaigns planned and bought by AI. The tools are there already, it’s just whether marketers are willing to trust the technology with their money. The optimization, on the other hand — the bit that comes after the ad has been bought and the client wants to sweat those dollars harder — remains a work in progress.

Bregman expanded on the point: “The idea of funding the fluidity [of campaign optimization] that comes as a result of AI is something that not a lot of advertisers are comfortable with.”

Eventually, however, this stance will change — whether marketers are comfortable with it or not. The [emergence of AI solutions](#) from Google (Performance Max) and Facebook (Advantage+) make that all too clear. Both solutions can be whittled down to this: advertisers share their data with the tech, upload the creative assets, set the financial parameters (think daily budget cap, price per conversion etc.) and sit back and wait for it to report back aggregate results.

It makes sense then the marketers are taking a trust but verify approach to many of these solutions.

“For advertisers, they see us a bit like the United Nations when it comes to being able to look at all the different options on the table, test out the use cases of them and then figure out how to get the most out of them,” said Bregman.

Fulfilling a role like this is tricky to say the least. Not only are the likes of Havas Media Group having to stay on top of thinking about what AI means for their own businesses, they’re having to help marketers do the same thing. And all while making sure they avoid [AI becoming another existential crisis](#). No wonder the group is trying to gather up as much knowledge on the matter as possible. It’s not just building out its own already substantial team of data scientists, it’s also working with academia, startups and platforms too. Oh, and there’s the cost.

“We’re still trying to figure out the numerator denominator of the tech ROI equation, because none of this is cheap,” said Bregman. “Data scientists aren’t cheap and the ones we have here are very busy these days.”

It’s akin to being in an arms race, in many ways.

Whether it’s Havas Media Group or another agency, they’re all trying to rewire their businesses around AI. The challenge is figuring out how fast they should do it. Move too fast, and the impact the technology has on the structure and subsequent operations of a holding group like Havas Media Group could prove to be too disruptive in a very transitory period. Go too slow, though, and the business could struggle to keep pace with counterparts that are more efficient and adaptive thanks to AI.

“I would love to find a way to make this pivot quickly but with tens of thousands of people to think about across our holding company, it’s going to be a journey,” said Bregman. “Agencies function through really good handoffs because there are so many different teams. The idea of having data at the core would fundamentally change how that works.”

That’s a big concept for any business to get its head around — let alone one where the data team still only accounts for a quarter of the group. That expertise either needs to find ways to permeate further and faster into the business or it needs to grow. Either way, the costs are steep. But they’re also necessary. AI is nothing but a data hog, after all. Indeed, the technologies thrive on ingesting large amounts of data.

“There are no AI-driven agencies today,” said Bregman. “I’m trying as much as I can to push us toward that direction so that we can be an agency of the future but we’re not quite there yet.”

Still, Havas Media Group has time to stick the landing on AI. Senior marketers haven’t even got to the point where they know what they don’t know — the preservation of agencies — when it comes to AI. AI hasn’t even come up in pitches, said Bregman. Eventually, it will, and when it does he wants to be able to respond accordingly.

“AI inputs should be viewed as a creative partner that can be leveraged to frame angles from a messaging perspective,” said Marc Hardgrove, CEO of search agency The HOTH. “But it takes a little practice to hone in which inputs work best for your team. At this point, there shouldn’t be a question as to whether to use AI— that horse is out of the gate and frankly, we all have been using AI tools for years, even before it was the big buzzword.”

146. [AI resource guide](#)

AI in Construction—What Does It Mean for Our Contractors?

Artificial intelligence is revolutionizing the construction industry by enhancing efficiency, safety and decision-making throughout the project lifecycle. AI in construction involves the application of advanced technologies like machine learning, computer vision and data analytics to various construction processes. Through AI, machines can learn and imitate human cognitive functions.

The importance of AI technology in construction should not be underestimated. It can help companies complete projects on time, minimize staffing challenges, save money and address safety concerns. AI learns from the data provided to it. It can adjust project plans based on the information it receives, allowing decision-makers to alter those plans or change them to improve safety or minimize inefficiencies.

It can enhance productivity, reduce costs, improve safety and promote sustainable practices, making it a vital tool for the industry's future growth and development. The possibilities may sound endless, but as an industry traditionally looking from the outside in at technology, we must first step back to educate ourselves on the basics. This resource is meant to act as a starting point in your journey to understand AI and its potential impact on the construction industry. By reading through definitions, construction use cases and considerations, the reader should walk away with a level of knowledge to ensure they can actively participate in future conversations on AI in construction.

Artificial Intelligence

Per The National Artificial Intelligence Initiative Act of 2020: “A machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments.”

Machine Learning

Application of AI that allows a system to automatically learn and improve from experience. In other words, machine learning helps computers do tasks like recognizing colors, finding pictures of cats on the internet or even suggesting what to watch on TV. It's like teaching the computer to be smart and make decisions by looking at lots of examples and learning from them. One common example of this are the Large Language Models.

Deep Learning

Per IBM: “Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers. These neural networks attempt to simulate the behavior of the human brain—albeit far from matching its ability—allowing it to ‘learn’ from substantial amounts of data. While a neural network with a single layer can still make approximate predictions, additional hidden layers can help to optimize and refine for accuracy.” Deep learning has achieved remarkable success in various applications, including self-driving cars, medical diagnosis, recommendation systems and more. Its power lies in its ability to automatically learn and adapt to new data, making it a cutting-edge technology in the field of AI and data analysis.

Generative AI

A type of AI that can create new data or content, such as images, text, music or even videos, by learning patterns and structures from existing examples. It works by understanding and mimicking the patterns and styles it has seen in the data it was trained on. The most publicly recognized tool in the last year is ChatGPT, built by the company OpenAI. ChatGPT is an artificial intelligence chatbot that can process natural human language and generate a response. It has revolutionized how we interact with computer systems and has influenced the evolution of AI. Additional generative AI tools from other major technology companies include: Meta's Llama 2, Microsoft's Copilot, Google's PaLM 2, Amazon's Bedrock and Dall-E 2, also from OpenAI.

Predictive AI

A type of AI that uses data and machine learning algorithms to forecast future events or trends. It helps businesses and organizations make informed decisions by analyzing historical data, identifying patterns and making predictions based on those patterns.

Project Lifecycle Impacts/Examples

Preconstruction

Predictive Analytics: Analyze historical project data and current conditions to optimize construction schedules, resource allocation and task sequencing.

[Alice Technologies](#)—End users can harness the power of artificial intelligence to enhance construction planning and scheduling abilities to keep jobsite labor moving

Optimized Design Development: Allow project stakeholders to identify the best design for a building based on real-world data; Rapidly create and explore a variety of unique design options.

[Hypar](#)'s artificial intelligence function lets you describe a building and turn your text into a quantifiable building model

[Augmenta](#)—A fully automated building design platform in the cloud, built from the ground up around generative AI. It creates highly cost-, labor-, time- and energy-efficient designs that are fully code compliant, error-free and constructible

Construction

Drawings:

[Blueprints AI](#)—An advanced artificial intelligence-powered tool designed specifically for the construction industry to automate the takeoff process. This tool significantly reduces the time and effort required for construction estimators to quantify materials and costs from blueprints and plans

[Stack](#)—STACK Assist, its Artificial Intelligence functionality automating takeoff tools for contractors, will allow contractors to use measurements specific to the trades they need, and AI will perform takeoff and counts automatically.

[Togal.AI](#)—After uploading construction drawings, state-of-the-art artificial intelligence modeling will complete as much of the takeoff as possible

Supply Chain: Throughout the procurement process for self-performing contractors, artificial intelligence will empower the purchasing team to quickly identify availability and best pricing within a certain region.

[SubBase](#)—Effortlessly streamline invoice reconciliation through a centralized inbox, utilizing AI for automated logs, cost code confirmation and a custom-digitized approval workflow

[Kojo](#)—simplifies the complex task of material sourcing, saving time, reducing costs, and enhancing project outcomes. Using state-of-the-art technologies like OpenAI's GPT-4 and Hugging Face transformer models, along with comprehensive statistical and machine learning methods, the Kojo Intelligence Layer helps contractors efficiently find project-appropriate materials at optimal prices

Contract Review: Empower legal teams to quickly identify critical risk factors in construction contracts

Construction

Autonomous Equipment:
[AIM](#)—Enable existing equipment to run at full utilization every day of the year, in any weather, without an operator and with 360-degree safety technology preventing any accidents

Project Management:
[SmartBuild](#)—At the core, Smartbuild's intuitive and easy system has the necessary process and performance timelines to manage projects for success. In partnering with Microsoft, Smartbuild users gain access to seamless operations and informed decision making through the Azure AI platform

[Procore Copilot](#)—Artificial intelligence-powered conversational and predictive experience that will provide customers the ability to automate time-intensive, manual processes across the Procore platform

[Autodesk](#)—Construction IQ delivers automated risk analysis of quality and safety data from Autodesk Construction Cloud to help projects advance faster and with less risk. AutoSpecs in ACC is an automated submittal process that helps users generate submittal logs in minutes and leverages construction IQ to suggest potentially missing items

Computer Vision/Intelligent Site Monitoring: Increase safety and security on jobsites. Through machine learning, video footage is trained to detect things like the number of workers entering/exiting the jobsite, workers in proximity of heavy construction machinery and even safety violations, such as the lack of face protection while saw-cutting concrete

Safety:

[Dozer](#)—Computer vision for jobsite equipment; With a 360-degree view, the cameras can see the cabin, bucket and everything in between. Proprietary artificial intelligence models calculate a depth map of the surrounding area and constantly monitor various elements of your jobsite

Labor

Tracking:

[AlwaysAI](#)—Computer vision enables existing cameras to immediately identify and interpret objects in the physical world; Manage direct labor and material costs more efficiently and provide a safer and more secure working environment by leveraging existing camera infrastructures with practical AI for construction

Jobsite

Mapping:

[DroneDeploy](#)—Mapping application that uses artificial intelligence to process images; DroneDeploy uses machine learning to decode images and find patterns that are invisible to the human eye

Building Maintenance

Energy Management: Analyze energy usage patterns and optimize HVAC systems to reduce energy consumption and overall costs

Predictive Maintenance: Through the expanded use of building automation and control networks, AI can predict when building equipment is likely to fail, allowing for a proactive response

HR Office Considerations

Per insights from Littler professionals, the following are things to consider when drafting inter office AI policies. Please also note that ‘insights’ do not constitute legal advice.

As construction technology continues to be a driving voice in the industry, there are also discrete factors that need to be considered, particularly around the use of artificial intelligence within our work environments.

Some of the examples listed in the prior sections, such as the use of generative AI, may be more commonly embraced quicker than others in the construction industry. HR professionals will need to consider asking questions on the use of AI in the office. Before laying out a blanket policy, clearly define the purpose of the AI usage policy, which may include what AI technologies are covered and how it applies to employees and/or outside stakeholders.

An AI usage policy should include a purpose or mission statement, an AI definition section, an explanation of who the policy applies to and a policy that allows for open use or prohibits or limits

AI use. Designate certain point people to oversee AI usage, to troubleshoot problems if they arise and who can approve of AI use. Clarify a policy that instructs employees that programs like ChatGPT still makes a lot of mistakes and that these programs should be used to assist employees and not serve as a substitute.

Training and awareness are key to ensure employees are well-informed about the AI usage policy and how it impacts their roles and responsibilities. Consider training managers on AI use. As is the case for most technologies, human interaction is still an important factor. Consider an overall approach that monitors AI use and encourages innovation, but ensures that AI is only used to augment internal work and with proper data.

Conclusion

Artificial intelligence has been in the background of some of our everyday technologies, but in the last year has come closer to the surface thanks to strategic marketing and perhaps a more consumer-friendly approach. There are still a lot of unknowns on what the impact will be and what the technology could look like in the next few years.

First, we need to consider how AI will increase productivity and eliminate many of the manual entry tasks that bog down our days. We can obtain the ability to augment the search for knowledge and completing tasks.

Secondly, we should continue to push closer and closer towards becoming a digital workforce. Artificial intelligence and the many layers involved in its functions rely heavily on clean and consistent data. This leans into the transformation of our workforce: Who is managing this data? How are we managing the data? How are we using the data in an effective manner?

The existing gap between academia and skilled trades is closing in, which offers the industry immense opportunity to continue to evaluate how we deliver projects on time, within budget and safely. As Director of Product Management at Autodesk Pat Keaney puts it, “AI undoubtedly has wide-reaching implications for the construction industry. In construction, how you build should be as rewarding as what you build, and implementing AI into the construction process will help the industry improve the quality of construction jobs and make workers safer and more productive”.

[147. Domino's \(DPZ\) Boosts AI Capabilities With Microsoft Partnership](#)

Domino's Pizza, Inc. DPZ recently announced a collaboration with Microsoft Corporation MSFT to generate AI solutions. The initiative will likely enhance the pizza ordering process and simplify store logistics. The company intends to pilot the AI-powered solutions within the next six months.

Per the agreement, Domino's and Microsoft will establish an Innovation Lab, pairing both

companies' executives with engineers to accelerate the time-to-market for smart store and ordering solutions. The company will leverage the Microsoft Cloud and Azure OpenAI Service to boost loyalty and engagement for customers, franchisees and employees.

Meanwhile, the company stated that it has progressed in modernizing store systems and is in the early stages of developing an Azure OpenAI Service-powered generative AI assistant. The solution is meant to assist store managers with daily activities like staff scheduling, ingredient ordering, and inventory management. Also, it emphasized streamlining pizza preparation and quality controls with more predictive tools.

As consumer preferences rapidly evolve, generative AI has become a game-changer for fulfilling new needs and improving the customer experience. Nevertheless, the company is optimistic concerning the strategic partnership and anticipates the initiative to drive growth in the upcoming periods.

Emphasis on Digital initiatives

Domino's invests heavily in technology-driven initiatives like digital ordering to boost sales. The company continues to innovate across all aspects of its business — including GPS, e-bikes, AI in-store technology, great food and an evolving digital experience.

In June 2023, the company rolled out a new Pinpoint Delivery service in the U.S. market. The concept is based on providing food deliveries to locations based on PIN and without a standard address.

During the first quarter of fiscal 2023, the company initiated the rollout of electric vehicles for pizza delivery. Apart from this, enhanced make-line and cut-table technology and AI-enabled forecasting are being rolled out to better match demand with capacity. The initiatives will likely enhance the speed, accuracy and efficiency of services in the future.

In the past year, shares of the company have gained 10.2% compared with the industry's 4.2% growth.

Domino's currently carries a Zacks Rank #3 (Hold).

Some better-ranked stocks in the Zacks Retail-Wholesale sector include:

Arcos Dorados Holdings Inc. ARCO sports a Zacks Rank #1 (Strong Buy). It has a trailing four-quarter earnings surprise of 35%, on average. The stock has gained 14% in the past year. You can see the complete list of today's Zacks Rank #1 stocks [here](#).

The Zacks Consensus Estimate for Arcos Dorados' 2023 sales and EPS suggests rises of 19.2% and 13%, respectively, from the year-ago period's levels.

El Pollo Loco Holdings, Inc. LOCO currently carries a Zacks Rank #2 (Buy). It has a trailing four-quarter earnings surprise of 23.7%, on average. Shares of LOCO have dropped 5.6% in the past year.

The Zacks Consensus Estimate for LOCO's 2024 sales and EPS indicates a 3.5% and an 18.3% growth, respectively, from the year-ago period's levels.

148. [Bad News? Send an AI. Good News? Send a Human](#)

Abstract

The present research demonstrates how consumer responses to negative and positive offers are influenced by whether the administering marketing agent is an artificial intelligence (AI) or a human. In the case of a product or service offer that is worse than expected, consumers respond better when dealing with an AI agent in the form of increased purchase likelihood and satisfaction. In contrast, for an offer that is better than expected, consumers respond more positively to a human agent. The authors demonstrate that AI agents, compared with human agents, are perceived to have weaker intentions when administering offers, which accounts for this effect. That is, consumers infer that AI agents lack selfish intentions in the case of an offer that favors the agent and lack benevolent intentions in the case of an offer that favors the customer, thereby dampening the extremity of consumer responses. Moreover, the authors demonstrate a moderating effect, such that marketers may anthropomorphize AI agents to strengthen perceived intentions, providing an avenue to receive due credit from consumers when the agent provides a better offer and mitigate blame when it provides a worse offer. Potential ethical concerns with the use of AI to bypass consumer resistance to negative offers are discussed.

Marketing managers currently find themselves in a period of technological transition, wherein artificial intelligence (AI) agents are increasingly viable replacement options for human representatives in administering product and service offers directly to customers. AI agents have been adopted across a broad range of consumer domains to handle both face-to-face and remote customer transactions ([Davenport et al. 2020](#); [Harris, Kimson, and Schwedel 2018](#); [Huang and Rust 2018](#); [Wirtz et al. 2018](#)), ranging from traditional retail and travel ([Mende et al. 2019](#)) to ride and residence sharing ([Hughes et al. 2019](#)) and even legal and medical services ([Esteve et al. 2017](#); [Turner 2016](#)). Given AI agents' advanced information processing capabilities and labor cost advantages ([Kumar et al. 2016](#)), the transition away from human representatives in administering product and service offers seems predominately advantageous for firms. Despite AI's potential, scant research has examined how consumers evaluate AI systems in relation to equivalent offerings delivered by humans.

The increasingly pervasive use of AI raises the possibility that offers administered by AI agents may impact consumer response in novel ways as compared with offers administered by human agents. For example, Uber uses an AI machine learning system to estimate travel elasticities and administer ride price offers ([Newcomer 2017](#)). Imagine a customer who pays for an Uber ride downtown but, for the return trip, unexpectedly receives a price offer triple the original. Does administration of this worse-than-expected offer by an AI agent, rather than a human agent, have implications for purchase likelihood, customer satisfaction, or intentions toward the use of Uber in the future? What if the return trip was unexpectedly much cheaper than anticipated, resulting in a much better-than-expected offer for the consumer? The present research theorizes and demonstrates an interaction between the type of agent and outcome expectation discrepancies, such that consumers respond less negatively to worse-than-expected price offers when transmitted by AI agents (compared with human agents) and more positively to better-than-expected price offers when transmitted by human agents (compared with AI agents). In addition, this interaction is

further moderated by anthropomorphic characteristics of the AI. The more humanlike the AI is in terms of its appearance or cognitive functions, the more it reduces the expectations discrepancy gap between human and AI agents. This moderator represents a strategic managerial input that can be used to manage customer satisfaction on the basis of the customer's price expectations.

Our theory and findings have key implications for firms enlisting both human and AI agents who administer outcomes that are discrepant from expectations. These findings are relevant for price offers, in addition to other situations where consumers learn of unexpectedly negative outcomes along dimensions other than price, such as cancellations, delays, negative evaluations, status changes, product defects, rejections, service failures, and stockouts. Our findings are also pertinent to instances where consumers receive unexpectedly positive outcomes such as expedited deliveries, rebates, upgrades, service bundles, exclusive offers, loyalty rewards, and customer promotions. Managers can apply our findings to prioritize (vs. postpone) human-to-AI role transitions in situations where negative (vs. positive) discrepancies are more frequent and impactful. Moreover, our results suggest that even when a role transition is not holistically passed to an AI, the selective recruitment of an AI agent to disclose certain discrepant information can still be advantageous. Firms that have already transitioned to consumer-facing AI agents, including the multitude of online and mobile applications that use AI-based algorithms to create and administer offers, also stand to benefit from our findings. Our research reveals that AI agents should be selectively anthropomorphized (i.e., depicted as either machinelike vs. humanlike) depending on whether an offer will be worse or better than expected.

Our research contributes to the literature in multiple ways. First, we show that AI (vs. human) agents asymmetrically alter the effects of outcome expectation discrepancies on purchase, satisfaction, and reengagement intentions, thereby broadening the associated literature examining human-AI transactions in marketing contexts (e.g., [Huang and Rust 2018](#); [Kim and Duhachek 2020](#); [Longoni, Bonezzi, and Morewedge 2019](#); [Mende et al. 2019](#); [Srinivasan and Abi 2021](#)). Whereas the growing literature on technology in marketing has shown that consumer engagement tends to decrease when an AI agent administers a transaction (e.g., through a perceived lack of human mental or emotional attributes on the part of the representative; [Longoni, Bonezzi, and Morewedge 2019](#); see also [Dietvorst, Simmons, and Massey 2015](#)), we reveal how transactions with AI can either improve or undermine purchase tendencies and reengagement intentions depending on the valence of deviation from consumer expectations.

Second, whereas previous research has shown largely positive consequences of anthropomorphized products in the form of increased consumer engagement and product liking ([Aaker, Vohs, and Mogilner 2010](#); [Aggarwal and McGill 2007](#); [Waytz, Heafner, and Epley 2014](#)), or generally negative compensatory responses ([Mende et al. 2019](#)), we show an asymmetric pattern such that consumers transacting with anthropomorphized AIs are more likely to react negatively to worse-than-expected marketing offers but respond more favorably to better-than-expected offers from anthropomorphized AIs owing to the role of perceived intentions. Third, we provide evidence that our effects are not driven by potential alternative explanations, including uncanny valley theory ([Mori, MacDorman, and Kageki 2012](#)) or AIs' superior market tracking ability. We note that prior research exploring the anthropomorphism of AI agents has argued for an uncanny valley effect that leads people to avoid agents that appear too humanlike, ostensibly due to eeriness that emerges after a certain inflection point ([Kim, Schmitt, and Thalmann 2019](#); [Mende et al. 2019](#); [Mori, MacDorman, and Kageki 2012](#)). Our research demonstrates AI anthropomorphism patterns that are ostensibly incompatible with an uncanniness explanation and that emerge even

when empirically controlling for uncanniness perceptions. Instead, we reveal how AI (vs. human) agents are inferred to have weaker selfish and benevolent intentions when developing discrepant offers, with implications for subsequent consumer response. In doing so, we suggest a new and important process driving both aversion to and engagement with anthropomorphized AI agents.

As a fourth contribution, our research reveals that the use of AI agents to administer offers can simultaneously present ethical dilemmas alongside opportunities for marketing firms. On the one hand, our work reveals opportunities for firms to receive due (and perhaps otherwise overlooked) credit for offers that are better than expected, with corresponding improvements in customer response. On the other hand, our work also reveals the possibility of AI misuse as a darker tool through which marketers can increase the acceptance of offers that fall short of expectations while simultaneously increasing intentions to reengage with the offending firm.

Theoretical Framework

Expectations Discrepancy Theory in Marketing Transactions

We examine the impact of AI versus human product and service offer administration through the theoretical lens of discrepant outcome expectations—that is, consumer reactions to offers that are better or worse than expected on a key dimension. Although expectation discrepancies have been examined in a variety of interpersonal sales transaction contexts (e.g., [Darke, Ashworth, and Main 2010](#); [Evangelidis and Van Osselaer 2018](#); [Oliver, Balakrishnan, and Barry 1994](#)), to our knowledge, no studies have investigated the implications of AI agents as transaction administrators. Although no research has specifically examined this phenomenon, extant research into robotics and artificial intelligence suggests that AI (vs. human) agents could have either positive or negative effects when administering price offers that are better or worse than expected. We next consider the extant literature on expectancy theory, followed by a conceptual integration with recent AI research.

The broad body of research that examines expectation discrepancies for product and service offers assumes that a set of expectations exists prior to entering a consumption event, and offers trigger a comparison against expected referents ([Evangelidis and Van Osselaer 2018](#); [Oliver and DeSarbo 1988](#)). For example, a buyer entering into a potential Uber transaction could have expectations for a price of \$20 based on historical experience but then receive a ride price offer of \$30 (worse than expected) or \$10 (better than expected). Worse-than-expected offers elicit an adverse reaction and have been demonstrated to lead to lower purchase likelihood, satisfaction, and desire to reengage with specific sales agents, whereas better-than-expected offers produce favorable consumer responses ([Oliver, Balakrishnan, and Barry 1994](#); [Spreng, MacKenzie, and Olshavsky 1996](#)). These expectations can relate to many aspects of service and product experiences, including temporal dimensions such as product/service delivery time, attribute performance, price, and so on. Any dimension of consumer experience for which outcomes deviate from experience can potentially be used to form evaluations of the agent.

The current research aims to conjoin the extant literature on technology and expectations discrepancy theory by highlighting the important role of AI. The previous literature on expectations discrepancy has assumed a human agent during offer administration. AI is perceived differently than human agents in many aspects because it is an artificially created technology ([Dietvorst, Simmons, and Massey 2015](#); [Longoni, Bonezzi, and Morewedge 2019](#); [Mende et al. 2019](#)). Moreover, AI technology endowed with machinelike versus humanlike features (e.g., a

name or face) appears to trigger different perceptions about its capabilities ([MacDorman, Vasudevan, and Ho 2009](#); [Waytz, Heafner, and Epley 2014](#)), thereby potentially altering responses to offers that are discrepant from expectations.

Transactions with AI Versus Human Agents: Inferred Intentions Matter

Previous research has shown that human agents are more liked and trusted than AI agents across a variety of contexts ([Dietvorst, Simmons, and Massey 2015](#); [Longoni, Bonezzi, and Morewedge 2019](#)). For example, consumers are more likely to prefer a medical service provided by a human versus an AI agent because AI agents are considered incapable of considering each patient's unique, individual, and situational characteristics ([Longoni, Bonezzi, and Morewedge 2019](#)). Thus, one could predict that the administration of an offer, such as offering a price for an Uber trip, by an AI (vs. a human) agent could negatively influence purchase, satisfaction, and reengagement outcomes regardless of how well the offer matches expectations. Moreover, extant research has shown that people have less aversion to inflicting physical punishment on an embodied AI (i.e., a robot) than a human ([Złotowski et al. 2015](#)), suggesting in particular that a worse-than-expected offer elicited by an AI could be met with a more adverse customer response. However, extant research has not considered transactional contexts that vary in the valence of outcome expectation discrepancy, for which we theorize that a different pattern of effects will emerge. We extend previous research revealing an AI aversion phenomenon in the contexts of prediction tasks and medical decisions ([Dietvorst, Simmons, and Massey 2015](#); [Longoni, Bonezzi, and Morewedge 2019](#)). In doing so, we contrast AI and human agents in the dimension of intentions inferred from their actions and theorize that transactional offers with the same face value could be evaluated as more acceptable when provided by an AI (vs. a human) agent, depending on the valence of the offer.

According to established models of intentionality, an action is perceived to be driven by intentions when it involves three key elements: a desired outcome based on one's own motives, a belief that the action will lead to that outcome, and one's autonomous decision to take the action ([Brand 1984](#); [Bratman 1987](#); [Malle, Moses, and Baldwin 2001](#)). Research has shown that individuals are capable of inferring intentions from others' actions, and an action that suffices for all three elements is perceived to have stronger intentions. A growing body of research suggests that AI (vs. human) agents are considered to have a lower capacity for self-motivated decision making and, by extension, lack the capacity to form their own intentions that drive subsequent actions. Because an AI agent is a nonhuman machine made by humans to serve humans ([Russell and Norvig 2010](#)), lay beliefs have formed such that AI agents' actions serve human goals and fulfill extrinsic human desires ([Huang and Chen 2019](#); [Kim and Duhachek 2020](#); [Russell and Norvig 2010](#)). Put differently using intentionality theory, AI agents lack the primary element of intentionality, namely self-motivated "desired outcomes," and thus, they do not qualify as agents that possess their own intentions ([Brand 1984](#); [Bratman 1987](#); [Malle, Moses, and Baldwin 2001](#)).

Social information processing theory has revealed that when approaching an interpersonal engagement with meaningful outcomes—such as a marketing transaction—individuals attempt to judge the other party primarily on inferred intentions ([Abele and Wojciszke 2007](#); [Wojciszke, Abele, and Barylą 2009](#)). Of particular importance to determining response is whether the intentions driving the other party's decision are inferred to be selfish (i.e., placing the self first) or benevolent (i.e., considerate of others; [Wojciszke, Abele, and Barylą 2009](#)). Inferred selfish (benevolent) intentions decrease (increase) favorable evaluation of an agent's actions. For

example, imagine that a human driver of a vehicle swerved into a wall to protect a child who jumped into the street chasing a ball. The benevolence of the action, if conducted by a human driver, would be praised, but the same action would receive less praise when conducted by an autonomous vehicle's AI system ([Awad et al. 2018](#); [Gray, Gray, and Wegner 2007](#); [Gray, Young, and Waytz 2012](#)). This explanation is also consistent with research demonstrating weaker perceptions of goodwill from benevolent actions conducted by humans (e.g., corporate social responsibility, prosocial behaviors) when those actions are not self-motivated ([Barasch et al. 2014](#); [Bolton and Mattila 2015](#); [Huang and Chen 2019](#); [Du, Bhattacharya, and Sen 2007](#); [Rand, Newman, and Wurzbacher 2015](#)). Moreover, inferences that a human agent's better-than-expected offer is driven by benevolent intentions tends to improve the recipient's evaluation of that offer ([Hilbig et al. 2015](#); [Radke, Güroğlu, and De Bruijn 2012](#)).

Conversely, we propose that a worse-than-expected decision driven by ostensibly selfish intentions (e.g., hitting the child instead of swerving into a wall) would be criticized more when conducted by a human (vs. an AI) agent. Such judgment is echoed across multiple contexts indicating that intentional violations by humans toward others are perceived to be more egregious than unintentional violations (e.g., in sports, criminal behavior, and resource management; [Gray 2012](#); [Güroğlu, Van den Bos, and Crone 2009](#)). For example, electric shocks are less painful when administered unintentionally compared with when administered with a malicious intent ([Gray 2012](#)). Intentions are also codified in criminal justice systems, such that acts committed while lacking intent of malice or selfishness are often met with milder punishment and individuals often receive less blame for their actions. A similar pattern emerges in marketing contexts for human agents that administer worse-than-expected offers, which are evaluated more negatively if inferred intentions are selfish, but less so if unintentional ([Tsiros, Mittal, and Ross 2004](#)). Extending this to our present research, and based on the premise that AI lacks the capacity for intentions, we propose that consumers will be less likely to infer benevolent intentions (in the case of a better-than-expected offer) and selfish intentions (in the case of a worse-than-expected offer) for the same offer transaction administered by an AI agent versus a human agent.

We theorize that this difference in inferred intentions will impact consumer purchase responses such as purchase likelihood and satisfaction. In the case of a worse-than-expected offer (vs. a better-than-expected offer), we propose that a human agent's intentions will be inferred as driven more by selfish intentions (vs. benevolent intentions), which, in turn, reduces (vs. improves) the likelihood of offer acceptance and subsequent customer satisfaction.

Stated formally,

H1: The effect of a price offer that is worse (better) than expected in lowering (raising) purchase likelihood and satisfaction is weakened when administered by an AI agent versus a human agent.

H2: The effect proposed in H1 is mediated by the inferred intentions of the offering agent. Specifically, in the case of a better-than-expected (vs. worse-than-expected) price offer, greater inferred benevolent (vs. selfish) intentions improve (vs. undermine) offer response. Both mediating intention pathways are attenuated when the offer is administered by an AI agent versus a human agent.¹

Empirical Overview

We evaluate our theory over a series of five studies. In Studies 1a and 1b, we examine our basic effect for worse-than-expected (Study 1a) and better-than-expected (Study 1b) offers to test H1. Study 2 tests our full model, including underlying process mechanisms, thereby testing H1 and H2. Studies 3a and 3b introduce a third hypothesis on the moderating effect of anthropomorphizing AI agents.

Study 1a: Response to a Worse-Than-Expected Offer from an AI Agent Versus a Human Agent

The primary objective of Study 1a was to test our proposition that acceptance of a worse-than-expected offer will be higher when administered by an AI agent versus a human agent. This study utilized a product resale context (resale of an aftermarket concert ticket) in which participants imagined receiving a price offer that was administered by either an AI agent or a human agent.

Method

Participants and design

The experiment was a 2 (agent type: human, AI) \times 2 (offer type: worse than expected, expected) group, between-subjects design. A total of 174 undergraduate students (Mage = 21.2 years; 56% female) participated in this study in return for course credit. We referred to previous AI research with similar experimental designs and determined our sample size based on the effect sizes and samples sizes reported in these studies ([Longoni, Bonezzi, and Morewedge 2019](#); [Mende et al. 2019](#)). The sample size for this and subsequent studies was determined to provide sufficient power to detect a medium size effect if it exists ([Bausell and Li 2002](#)). In addition, sample size was influenced by the size of the participant pool made available to the authors in the given semester.

Procedure

Participants were first instructed to provide their favorite musician whom they would most like to see in concert. Next, participants read a scenario in which they were asked to imagine that all the tickets for an upcoming concert of their favorite musician were sold out and the only way to attend the concert was to buy a resale ticket through an online ticket resale website. Participants in the human (AI) agent condition were told that the ticket was being sold by “another person” (“an artificial intelligence”). All participants were told that the agent was providing a price offer of \$140. Offer type was manipulated by telling the participants that the ticket was sold either at the same or a lower price to a different customer. Participants in the worse-than-expected (expected) offer condition were told that a similar ticket was recently sold for \$110 (\$140) to someone else. This approach of disclosing a lower sale price for the product to a different consumer is consistent with long-standing practice for eliciting a negative expectation discrepancy (e.g., [Fisk and Young 1985](#)). The offer type manipulation was validated with a pretest that showed a significant difference in price expectations between the two conditions (the pretest results are presented in the next section; further details on the stimuli and pretest are available in Web Appendix B). Then, participants indicated whether they would purchase the ticket (yes/no). Finally, participants responded to background questions (e.g., gender).

Results

Pretest

We conducted a pretest of offer type to assess our operationalizations of worse than expected (ticket sold to someone else for \$110; participants were offered \$140) and expected (ticket sold to

someone else for \$140; participants were offered \$140). One hundred fifty respondents from Amazon Mechanical Turk (MTurk) completed the pretest in return for monetary compensation. After reading the ticket scenario without agent descriptions, respondents answered the two-item expectancy disconfirmation scale from [Oliver \(1980\)](#) adapted to this context: “Think about what your expectations were for the price offer. How does the price that you were offered compare to your expectations?” (1 = “I expected a much lower price,” 4 = “Price was as I expected,” and 7 = “I expected a much higher price”; 1 = “Much worse offer than I expected,” 4 = “Offer was as I expected,” 7 = “Much better offer than I expected”). Analysis of the two-item composite ($r = .80$) revealed that the worse-than-expected offer condition was significantly below both the “as expected” midpoint (i.e., 4) ($M_{\text{worse}} = 2.90$, $SD = 1.36$; $t(75) = -7.06$; $p < .001$) and the expected condition ($M_{\text{expected}} = 3.98$, $SD = .96$; $F(1, 148) = 31.52$, $p < .001$, $\eta^2 = .18$), indicating a successful manipulation.

Offer acceptance

First, offer type (0 = worse, 1 = expected), agent type (0 = AI, 1 = human), and offer acceptance (1 = yes, 0 = no) were contrast coded and submitted to a binomial logistic regression. We observed a significant main effect of agent ($\chi^2 = 7.92$, $p = .005$) and no main effect of offer type ($\chi^2 = .40$, $p = .53$), both subsumed by a significant two-way interaction ($\chi^2 = 6.92$, $p = .009$). Further chi-square analysis revealed that the worse-than-expected offer was accepted more in the AI condition (49%) than in the human condition (19%; $\chi^2 = 8.39$, $p = .004$), thus confirming H1. In the expected offer condition, there was no effect of agent on offer acceptance ($\chi^2 = .60$, $p = .44$; see [Figure 1](#)).

Figure 1. Offer Acceptance Rate as a Function of Offer and Agent Type (Study 1a).

Notes: Error bars = ± 1 SEs.

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Discussion

Consistent with our theory and H1, the results of Study 1a indicate that consumers are more likely to accept a worse-than-expected product offer from an AI agent versus a human agent. This result is evidence that consumers respond differently to AI and human agents with respect to price expectation discrepancies stemming from marketing transactions. Our theory proposes that a better-than-expected offer will also provide a different pattern of results for offers administered by an AI agent versus a human agent. In Study 1b, we examine whether better-than-expected offers elicit a different pattern of response when administered by AI versus a human agent.

Study 1b: Response to a Better-Than-Expected Offer from an AI Agent Versus Human Agent

Study 1b addresses the case of a better-than-expected offer. We posit that offer administration by a human leads to more positive consumer outcomes as compared with AI.

Method

Participants and design

Two hundred ninety-nine MTurk participants (Mage = 41.9 years; female = 53%) completed this study for monetary compensation. All participants were randomly assigned to one of the conditions in a 2 (agent type: AI, human) × 2 (offer type: expected, better than expected) between-subjects design.

Procedure

The procedure was a ticket resale context adapted from Study 1a, with the exception that the worse-than-expected offer was replaced with a better-than-expected offer (for stimuli and pretest details, see Web Appendix C). Specifically, subjects in the better-than-expected condition were told that a similar ticket was sold recently for \$170 and were offered a price of \$140. Subjects in the expected condition were told that the ticket recently sold for \$140 and were offered a price of \$140. After receiving the offer, participants indicated whether they would purchase the ticket (yes/no), then responded to background questions (e.g., gender).

Results

Pretests

As in Study 1a, we conducted a separate pretest to validate our offer type manipulation with 150 MTurk participants who received monetary compensation. Using the same two items from Study 1a, we measured the extent to which participants perceived that the offer was better than they expected. Analysis of the two-item composite ($r = .72$) revealed that the mean score of the composite was higher in the better-than-expected offer condition ($M_{\text{better}} = 5.83$, $SD = 1.25$) when compared with the expected offer condition ($M_{\text{expected}} = 4.18$, $SD = 1.00$; $F(1, 148) = 80.8$, $p < .001$, $\eta^2 = .35$), indicating a successful manipulation.

Offer acceptance

First, offer type (0 = expected, 1 = better), agent type (0 = AI, 1 = human), and offer acceptance (1 = yes, 0 = no) were contrast coded and submitted to a binomial logistic regression. We observed a significant main effect of agent ($\chi^2 = 5.94$, $p = .02$) but no significant main effect of offer type ($\chi^2 = .99$, $p = .32$), both subsumed by a significant two-way interaction ($\chi^2 = 4.79$, $p = .03$). Further chi-square analysis revealed that the better-than-expected offer was accepted more in the human condition (89%) than in the AI condition (76%; $\chi^2 = 6.30$, $p = .01$), thus confirming H1. In the expected offer condition, there was no effect of agent on offer acceptance ($\chi^2 = .17$, $p = .69$; see [Figure 2](#)). This pattern supports H1.

Figure 2. Acceptance of Better-Than-Expected Offers by Agent Type (Study 1b).

Notes: Error bars = ± 1 SEs.

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Discussion

Study 1b demonstrated that consumer response to better-than-expected offers are systematically influenced by the administering agent. Consistent with our theory, we found that the same better-than-expected offer elicits a more positive evaluation when administered by a human instead of an AI agent. Coupled with the results of Study 1a, these findings provide direct support for H1.

Study 2: Inferred AI Intentions Alter Offer Acceptance

Study 2 served multiple objectives. First, in this study we build on Studies 1a and 1b to test our full model by simultaneously considering both worse-than-expected and better-than-expected offers. Second, we assess our proposed process model, thereby testing H2. Specifically, we investigate whether the intentions of an AI (vs. a human) agent are inferred to be less selfish (in the case of a worse-than-expected offer) and less benevolent (in the case of a better-than-expected offer), which in turn influences offer evaluation. Study 2 also tests for several alternative explanations, including uncanniness. Study 2 employs a ride-sharing service context to build on the results of Study 1b.

Method

Participants and design

All participants were randomly assigned in a 2 (agent type: human, AI) \times 3 (offer type: worse than expected, expected, better than expected) between-subjects design. Six-hundred ninety-eight undergraduate business students (Mage = 21.2 years; female = 59%) completed this study for partial course credit.

Procedure

Participants first read an introduction, which explained that they would participate in a study containing a scenario related to Uber, a ride-sharing service. First, participants read a short passage explaining that the price offered at Uber is determined by an Uber agent, with the description of that agent manipulated between conditions. We adapted agent type descriptions from previous research on AI and service robots ([Kim and Duhachek 2020](#); [Mende et al. 2019](#)). Participants were told, “This is your Uber agent who will personally determine the offer price of your Uber rides, named [Alex/XT-1000].” In the human condition, an image of a human was presented, adapted from [Mende et al. \(2019\)](#), whereas in the AI condition an image of a robot pretested to be moderately humanlike was presented (stimuli details in Web Appendix D; Development procedures for AI stimuli in Web Appendix G).

Next, participants read about and evaluated a price offer from the Uber agent. The scenario explained that the initial cost of a ride from home to a restaurant for dinner was \$20, and for the return trip home they were later offered the price of \$20 in the expected condition, \$30 in the worse-than-expected condition, and \$10 in the better-than-expected condition. As the dependent measure, we asked participants their likelihood of accepting the offer (1 = “not at all likely,” and 7 = “very likely”).

To assess process, we collected measures of inferred agent intentions when administering the offer. The measurement items for the selfish and benevolent intentions were developed based on previous studies of valenced intentionality ([Gray 2012](#); [Gray and Wegner 2008](#)). Specifically, we collected three items measuring inferred benevolent intentions (“To what extent do you agree with the following statements about Uber agent’s own, personally created intention when forming your individual ride price offer? Uber agent had their own ...” “benevolent intentions,” “generous intentions,” “good intentions” [1 = “strongly disagree,” and 7 = strongly agree]); the three items were averaged to create an index of benevolent intentions, $\alpha = .84$) and three items measuring inferred selfish intentions (“Uber agent had their own ...” “selfish intentions,” “greedy intentions,”

“bad intentions” [1 = “Strongly disagree,” and 7 = “Strongly agree”] averaged to create an index of selfish intentions, $\alpha = .93$).

We also recorded measures for alternative processes, including uncanniness (“I feel uneasy,” “I feel unnerved,” “I feel creeped out”), whether respondents may have perceived the original price to the restaurant to be overpriced (“Do you feel that you overpaid for the first Uber trip that you took to the restaurant?”), whether respondents perceived different price tracking capacity between the two agents (“To what extent do you think the Uber agent was able to track the real-time price changes of other people's rides and made an offer to you based on this market information?”), and whether respondents perceived that the offer is controlled by someone else (“To what extent do you think that the Uber agent's price offer was controlled by another person behind the scene?”). Finally, participants responded to background questions (e.g., gender).

Results

Pretests

Just as in the previous studies, we conducted separate pretests to validate our manipulations of agent type and offer type (for details, see Web Appendix D). The pretest of offer type assessed our operationalizations of a worse-than-expected offer (\$30 price offer with a \$20 precedent), better-than-expected offer (\$10 price offer with a \$20 precedent), and the expected price offer (\$20 price offer with a \$20 precedent). Three hundred respondents from MTurk completed the pretest in return for monetary compensation. Respondents answered the same two-item expectation discrepancy scale used in previous studies. Analysis of the two-item composite ($r = .81$) revealed the main effect of offer type ($F(2, 297) = 82.85, p < .001, \eta p^2 = .36$). Additional contrasts revealed that the mean score of the composite was significantly higher in the better-than-expected offer condition ($M_{\text{better}} = 5.19, SD = 1.47$) compared with the expected offer condition ($M_{\text{expected}} = 3.99, SD = .94; F(2, 297) = 46.05, p < .001, \eta p^2 = .19$), and the mean score of the composite in the expected offer was higher than the worse-than-expected offer condition ($M_{\text{worse}} = 2.84, SD = 1.40; F(2, 297) = 46.27, p < .001, \eta p^2 = .19$). These results indicate a successful manipulation of offer type.

Offer acceptance likelihood

A 2 (agent type: human, AI) \times 3 (offer type: worse than expected, expected, better than expected) analysis of variance (ANOVA) revealed a significant main effect of offer type ($F(2, 692) = 150.61, p < .001, \eta p^2 = .30$) and no main effect of agent type ($F(2, 692) = .06, p = .80, \eta p^2 < .01$), both subsumed by a significant two-way interaction ($F(2, 692) = 7.18, p = .001, \eta p^2 = .02$). A series of planned contrasts revealed that acceptance of the expected offer was not significantly different between agent types ($M_{\text{human}} = 3.69, SD = 1.99; MAI = 3.40, SD = 1.75; F(2, 692) = 1.71, p = .19, \eta p^2 = .006$). In contrast, and as we predicted, acceptance of the better-than-expected offer was significantly higher in the human (vs. AI) condition ($M_{\text{human}} = 5.58, SD = 1.19; MAI = 5.23, SD = 1.62; F(2, 692) = 4.28, p = .04, \eta p^2 = .02$). Also as predicted, acceptance of the worse-than-expected offer was significantly higher in the AI (vs. human) condition ($M_{\text{human}} = 2.53, SD = 1.59; MAI = 3.17, SD = 1.90; F(2, 692) = 8.46, p = .004, \eta p^2 = .03$) (see [Figure 3](#)).

Figure 3. Offer Acceptance Likelihood as a Function of Offer and Agent Type (Study 2).

Notes: Error bars = ± 1 SEs.

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Moderated mediation via intentions

To assess the underlying process, we first evaluated selfish and benevolent intentions via ANOVA. The 2 (agent type: human, AI) \times 3 (offer type: worse than expected, expected, better than expected) ANOVA of selfish intentions revealed a significant main effect of offer type ($F(2, 692) = 18.39, p < .001, \eta^2 = .05$) and no main effect of agent type ($F(2, 692) = 1.95, p = .16, \eta^2 = .003$), and the predicted two-way interaction matched the results for offer acceptance ($F(2, 692) = 7.60, p = .001, \eta^2 = .02$; for the profile plot and pairwise comparisons, see Web Appendix D). The 2 \times 3 ANOVA of the benevolent intentions measure revealed a significant main effect of offer type ($F(2, 692) = 20.53, p < .001, \eta^2 = .06$) and a marginally significant main effect of agent type ($F(2, 692) = 3.64, p = .057, \eta^2 = .01$), both subsumed by the predicted two-way interaction ($F(2, 692) = 9.93, p < .001, \eta^2 = .03$; for profile plots and pairwise comparisons, see Web Appendix D, p. 9).

To assess mediation via intentions, we conducted a moderated mediation analysis using a [Hayes \(2017\)](#) PROCESS model (Model 7) in which offer type (worse than expected, expected, better than expected) served as the multicategorical independent variable, inferred intentions (i.e., selfish and benevolent intention perceptions) served as the two mediating variables, offer acceptance likelihood served as the dependent variable, and agent type (human, AI) served as the moderating variable. This analysis revealed that the index of moderated mediation for both selfish and benevolent intentions did not include 0 (indirect effect for selfish intention = .12; 95% confidence interval: [.05, .21]; indirect effect for benevolent intention = .14; 95% confidence interval: [.07, .23]), indicating that the offer type \rightarrow inferred intentions \rightarrow acceptance likelihood path is moderated by agent type.

Alternative mechanisms

The first alternative mechanism assessed was the uncanniness index (three-item average, $\alpha = .91$). An ANOVA of the uncanniness index revealed that AI was perceived as more uncanny than a human only in the expected offer condition ($M_{AI} = 2.98, SD = 1.29; M_{human} = 2.50, SD = 1.35; F(2, 692) = 6.96, p = .01$). More germane to our inquiry, the two-way interaction between the agent and offer type was not significant, resulting in a pattern inconsistent with explaining our results. The second alternative mechanism assessed was whether the perception the original fare (i.e., \$20 to get to the restaurant) was overpriced. An ANOVA of the overpricing perception revealed a significant main effect of offer type ($M_{worse} = 4.14, SD = 1.70; M_{expected} = 5.10, SD = 1.53; M_{better} = 5.52, SD = 1.39; F(2, 692) = 49.00, p < .001$). However, there was no interaction between the agent and the offer ($F(2, 692) = 2.19, p = .11$), precluding it as a driver of the observed pattern of mediation. Third, we assessed the agent's market-price-tracking capability as an alternative mechanism. An ANOVA of price tracking capability revealed a significant main effect of agent ($F(2, 692) = 22.90, p < .001$) and offer type ($F(2, 692) = 3.38, p = .04$). However, there was no interaction between the agent and the offer ($F(2, 692) = .16, p = .86$), resulting in a pattern inconsistent with explaining our results. Finally, ANOVA of the perception that the offer is controlled by another person revealed only a significant main effect of agent ($F(2, 692) = 6.03, p = .01$). The main effect of offer ($F(2, 692) = 2.03, p = .13$) and the interaction ($F(2, 692) = 1.60, p = .20$) were not significant, also resulting in a pattern inconsistent with explaining

our results. Taken together, these results rule out multiple alternative explanations and lend further confidence to our conceptual model.

Discussion

The results of Study 2 extend our understanding of how offers that are discrepant from expectations systematically elicit different responses between human and AI agents. We replicate the differential human versus AI effects observed in Studies 1a and 1b, supporting H1. Specifically, worse-than-expected offers are more likely to be accepted when administered by an AI, whereas better-than-expected offers are more likely to be accepted when administered by a human. Moreover, our results reveal that inferred intentions mediate the observed effects, in support of H2. Specifically, a worse-than-expected (better-than-expected) offer from a human increases (decreases) inferred selfish intentions and decreases (increases) inferred benevolent intentions, which in turn decreases (increases) offer acceptance. However, an AI agent attenuates these pathways, thereby leading to an acceptance increase in the case of a worse-than-expected offer, but an acceptance decrease in the case of a better-than-expected offer, compared with a human agent. In addition, this study rules out several potential alternative process mechanisms.

Studies 3a and 3b: Anthropomorphism of AI Agents

In our final two studies, Studies 3a and 3b, we extend our work beyond the human–AI dichotomy to consider different forms of AI agents. We propose that AI agents may be anthropomorphized through their presentation to be perceived as more humanlike (vs. machinelike), thereby eliciting patterns more consistent with human agents. In doing so, we provide insights for managers on how to best depict their AI agents (i.e., as more humanlike vs. more machinelike) in situations where consumers will receive better- or worse-than-expected offers.

Research has revealed that endowing an AI with humanlike features typically makes people perceive the AI more positively. For example, consumers assessing an AI agent that controlled an autonomous vehicle became more trusting as that agent was presented as increasingly humanlike, rather than machinelike ([Waytz, Heafner, and Epley 2014](#)). Indeed, the marketing literature has shown that anthropomorphized products are predominately liked more and improve consumer engagement. For example, thinking about a product (e.g., a car) through an anthropomorphic perspective increases affection toward that product and leads to less willingness to replace it ([Chandler and Schwarz 2010](#)). Research has also shown that a product that resembles a human face in its design could increase perceived friendliness, leading to a positive evaluation of the product ([Landwehr, McGill, and Herrmann 2011](#)). As another instance, socially excluded consumers prefer anthropomorphized brands due to their need to establish relationships ([Chen, Peng, and Levy 2017](#)).

However, prior research investigating anthropomorphic AI has predominately focused on nonpurchase situations in which AI agents have been in a supporting role to consumers, such as providing safe transportation or providing medical advice. Our present inquiry builds on previous research by examining AI agents in a more adversarial role as administrators of product and service offers—that is, the consumer is sitting across the transaction table from the AI agent. In such transactional contexts, we propose that AI anthropomorphism will not have the generally favorable effect observed in many other contexts but will instead systematically either improve or worsen the impact of offers that differ from expectations.

The influence of AI anthropomorphism on response to discrepant offers will be driven by changes in the extent to which AI is perceived to be capable of intentionality (i.e., as defined by the previously discussed three elements of intentionality models; [Brand 1984](#); [Bratman 1987](#); [Malle, Moses, and Baldwin 2001](#)), thereby altering the strength of inferred AI intentions. As an AI agent's humanlikeness increases, so too should its perceived capacity for intentionality. Indeed, a mind capable of intentionality has been argued to be a defining aspect of what it means to be uniquely human, and items specifically measuring related constructs are embedded in multiple established anthropomorphism scales (e.g., [Kim and McGill 2011](#); [Waytz, Cacioppo, and Epley 2010](#)). Extant research has revealed that individuals are surprisingly willing to attribute advanced humanlike capabilities to anthropomorphized AI agents ([Złotowski et al. 2015](#)), potentially due in part to an overestimation of AI technical advancement stemming from fictional literature and film ([Pollack 2006](#)) and to the nature of human inference that assumes similar internal properties between entities that share common external appearances ([Rozin and Nemeroff 2002](#)). As such, AI agents that are viewed as increasingly anthropomorphic should be perceived to possess a greater capacity for intentionality, thereby generating stronger inferred intentions that increasingly elicit a response akin to a human agent.

We thus posit that anthropomorphizing an AI agent through the depiction of humanlike (vs. machinelike) properties will asymmetrically influence responses to discrepant offers. In the case of a better-than-expected offer, an anthropomorphized AI agent will lead to more positive downstream consequences (e.g., offer acceptance, satisfaction). Conversely, we hypothesize that the response to a worse-than-expected offer will become more negative when the AI agent is endowed with humanlike (vs. machinelike) properties. Stated formally,

H3: Anthropomorphism of an AI agent moderates the response to price offers that are better or worse than expected: a humanlike AI agent makes worse-than-expected offer responses more negative but makes better-than-expected offer responses more positive.

We test H3 in Studies 3a and 3b. In doing so, we provide valuable insights to managers who are faced with decisions regarding customer interactions with AI agents. If H3 is supported, our results suggest that selective anthropomorphism of AI agents could be applied to improve overall customer response to both worse- and better-than-expected offers.

Study 3a: The Moderating Role of Consumer Trait Anthropomorphism

In Study 3a, we extend our findings to consider the implications of anthropomorphism of AI agents for worse-than-expected offers. We do this utilizing an ecologically valid and managerially relevant segmentation measure: technology anthropomorphism ([Waytz, Cacioppo, and Epley 2010](#)). Technology anthropomorphism is the individual tendency to view technological products as possessing humanlike mental and emotional qualities. Consistent with our theory and H1, we predict that consumers will be more likely to accept a worse-than-expected offer from an AI than a human. Moreover, in concordance with the role of anthropomorphism specified in H3, this effect will be even stronger for individuals who perceive technological objects to be less humanlike, whereas the effect will attenuate for consumers who view technological objects as more humanlike. We also use a different context to test the robustness of our theory: an ultimatum game setting that examines the likelihood to accept both expected and unexpected allocations ([Morewedge 2009](#); [Thaler 1988](#)). Prior research has demonstrated that the ultimatum game is a highly controllable context in which human offers may be contrasted with offers proposed by a nonhuman agent (e.g., [Sanfey et al. 2003](#)). We advance beyond previous research by examining

the role of anthropomorphism of AI agents in the ultimatum context. Moreover, prior research has demonstrated that individuals have predictable and strong expectations regarding offer terms (Suleiman 1996), making this a context to which our theoretical predictions regarding worse-than-expected offers are particularly applicable.

Method

Participants and design

The experiment was a 2 (agent type: human, AI) \times 2 (offer type: worse than expected, expected) between-subjects design. A total of 403 members of an MTurk online panel (Mage = 34.9 years; 64% female) participated in this study in return for financial compensation.

Procedure

Participants first completed the full Individual Differences in Anthropomorphism Questionnaire (IDAQ) scale for trait anthropomorphism of nonhuman agents (Waytz, Cacioppo, and Epley 2010), which includes a subscale specific to technological devices. The five-item technological anthropomorphism scale measures the extent to which technology is viewed as having humanlike mental and emotional qualities (e.g., “To what extent does the average computer have a mind of its own?,” “To what extent does a car have free will?”; 0 = “not at all,” and 10 = “very much”; for the full list of IDAQ items, see Web Appendix E). We averaged the five items to form an index of technology anthropomorphism ($\alpha = .85$). Then, participants were invited to participate in an ostensibly unrelated study on decision making. Participants were introduced to an ultimatum game in which the other player was either a “human” or an “artificially intelligent machine” who would administer an offer determining how \$100 should be allocated. Previous research in behavioral economics has shown that an approximately even split (50%/50%) is both the modal offer by allocators and expectation by receivers, with splits even modestly outside of this range falling short of expectations and leading to an increasing tendency to reject the offer (Suleiman 1996). Thus, participants in the worse-than-expected offer condition received an offer of \$10 to themselves and \$90 to the other player, whereas participants in the expected offer condition received a \$50/\$50 offer. Participants then indicated their acceptance or rejection of the offer (1 = yes, 0 = no). Finally, participants responded to background questions (e.g., gender).

Results

Pretest

We conducted a pretest of offer type to assess our operationalizations of worse than expected (\$10/\$90) and expected (\$50/\$50). One hundred fifty respondents from MTurk completed the pretest in return for monetary compensation. After reading the ultimatum scenario, respondents answered an adaptation of the two-item expectations discrepancy scale as in the pretests for Studies 1a, 1b, and 2 (for pretest stimulus details, see Web Appendix E). Analysis of the two-item composite ($r = .92$) revealed that the worse-than-expected condition was significantly below the “as expected” midpoint ($M_{\text{worse}} = 1.68$, $SD = 1.21$; $t(72) = -16.36$; $p < .001$) and the expected condition ($M_{\text{expected}} = 4.10$, $SD = .59$; $F(1, 148) = 245.89$, $p < .001$, $\eta^2 = .18$), in support of a valid manipulation.

Offer acceptance

A binomial regression of offer acceptance (1 = yes, 0 = no) as a function of agent type (0 = human, 1 = AI) and offer type (0 = expected, 1 = worse than expected) revealed a main effect of agent type ($\chi^2 = 6.65$, $p = .01$) and main effect of offer type ($\chi^2 = 73.69$, $p < .001$), both subsumed by a significant two-way interaction ($\chi^2 = 4.00$, $p = .045$). In the case of an expected offer (i.e., an expected \$50/\$50 split), the offer was invariably accepted in both the AI (100%) and the human (100%) conditions, consistent with extant research in the ultimatum context. More germane to our theory, we conducted a chi-square analysis to compare the acceptance of worse-than-expected offers in the human and the AI conditions. As we predicted, acceptance of the worse-than-expected offer was significantly higher in the AI condition (78.6%) than in the human condition (60.4%; $\chi^2 = 7.73$, $p = .005$). These results of the purely human versus AI comparison were consistent with our theory and previous studies.

Moderation by trait anthropomorphism

We next tested how individual consumer tendencies to anthropomorphize AI (i.e., perceive AI as more human) altered offer acceptance. Consistent with H3, we expected that individuals who view AI as not possessing humanlike characteristics would be more likely to accept a worse-than-expected offer from an AI, whereas those who do attribute humanlike characteristics would be less likely to accept a worse-than-expected offer. For expected offers, anthropomorphism index and agent type necessarily had no effect on offer acceptance, as expected offers were invariably accepted at 100%. For worse-than-expected offers, we assessed the interaction between anthropomorphism index (Mean = 2.01, SD = 1.57) and agent type (human = 0, AI = 1) in determining acceptance through Johnson–Neyman (JN) analysis. Analysis revealed no main effect of anthropomorphism ($Z = 1.14$; $p = .26$) and a significant main effect of agent ($Z = 3.37$; $p = .001$), both subsumed by a significant interaction between the agent and anthropomorphism ($Z = -2.09$; $p = .037$). The result showed that for individuals with an anthropomorphism score below the JN point of 2.59—constituting 79.4% of the sample—acceptance of worse-than-expected offers was significantly higher from an AI versus a human. However, as anthropomorphism increased to the JN point of 2.59 and above—constituting 20.6% of the sample—no significant difference between agent type emerged (i.e., $p > .05$). No other regions of significance emerged at any higher levels of anthropomorphism (for JN graph and supplemental table illustrating interactions, see Web Appendix E, p. 14). That is, the positive effect of an AI (vs. human) agent on accepting a worse-than-expected offer emerges for individuals who are less likely to imbue the AI with humanlikeness, but does not hold for those individuals who increasingly attribute humanlike qualities to technology. These results support H3.

Discussion

The results of Study 3a provide further evidence that worse-than-expected offers are more likely to be accepted when administered by an AI (vs. a human) agent, in support of H1. Moreover, in support of H3, individual perceptions of AI anthropomorphism alter this pattern of response; decreasing technology anthropomorphism (i.e., the AI is seen as less humanlike) increases the likelihood of accepting a worse-than-expected offer from an AI agent, whereas higher levels of technology anthropomorphism (i.e., the AI is seen as more humanlike) result in responses similar to those elicited by an actual human.

These results have several important implications. First, our findings provide managers with a new, easily measurable variable for segmentation when attempting to understand and predict how consumers will interact with their AI systems—individual tendency toward technology

anthropomorphism. Second, our results suggest that anthropomorphism of the AI through means other than innate consumer tendencies, such as physical embodiment or descriptions of the AI mind, could impact response to unexpected offers. Indeed, the results of Study 3a reveal that most individuals tend to view technology as less than humanlike (e.g., the scale mean for technology anthropomorphism was substantially and significantly below the midpoint; $p < .001$), suggesting that the default view held by most consumers is that technology does not possess humanlike characteristics. In the next study, we examine how AI anthropomorphism can be manipulated, rather than measured, by marketers to lead to a differential acceptance of discrepant offers administered by AI.

Study 3b: Anthropomorphism, Satisfaction, and Reengagement

Study 3b expands on previous findings to examine how customer satisfaction and desire to maintain a relationship with the offering marketing agent varies depending on the level of humanlikeness of the AI agent administering a discrepant offer. Customer satisfaction is critical for firms ([Anderson, Engledow, and Becker 1979](#); [Williams and Naumann 2011](#)), and evidence revealing how AI anthropomorphism alters the impact of (dis)satisfaction stemming from better- or worse-than-expected offers would provide valuable insights for managers of AI agents. Regarding relationship maintenance, building a rapport between consumers and AI agents has become an important issue for companies utilizing AI agents as a primary contact point, with important implications for customer retention and relationship management ([Huang and Rust 2018](#); see also [Mende et al. 2019](#)). As such, in this study, we provide participants a choice to maintain (vs. replace) the relationship with the current agent following a worse-than-expected offer. Consistent with our theory, we predicted that the effect of a better-than-expected offer on the tendency to maintain versus replace the relationship would be stronger for a humanlike (vs. machinelike) AI agent and that the opposite pattern would result in the case of a worse-than-expected offer. To assess this prediction, we selected a novel pair of AI agents differing only in their perceived humanlikeness (i.e., no differences in perceived uncanniness), based on a comprehensive study of multiple robots drawn from the ABOT (<http://abotdatabase.info>) database (development of AI stimuli detailed in Web Appendix G).

Method

Four hundred MTurk participants (Mage = 36.7 years, female = 48%) completed this study for monetary compensation. All participants were randomly assigned to one of the conditions in a 2 (agent type: machinelike AI, humanlike AI) \times 2 (offer type: better than expected, worse than expected) between-subjects design. The overall procedure was similar to Study 2, which utilized an Uber ride-sharing context and explored customer satisfaction as the dependent variable. Participants read a short passage explaining that the price offered by Uber was determined by an AI agent (an initial \$20 trip followed by a return trip price offer of \$30 in the worse-than-expected condition and \$10 in the better-than-expected condition). The images used to depict the two AI agents were drawn from the ABOT database (<http://abotdatabase.info>) and pretested regarding their humanlikeness and uncanniness (pretest reported in the study “Results” subsection, additional details in Web Appendices F and G).

Participants then answered three items related to offer satisfaction (identical measures to Study 1b; “satisfied,” “appreciative,” and “grateful” regarding the offer; 1 = “not at all,” 7 = “very much”; the three items were averaged to create the index of satisfaction, $\alpha = .93$). We next asked participants the extent to which they wanted to interact with the same Uber agent in the future,

which served as a measure of willingness to reengage with the agent. Participants were given an opportunity to stay with the current Uber agent in future interactions or discontinue the relationship with the current Uber agent and replace it with a different agent in a binary choice paradigm. The replacement agent stimulus was adopted from previous consumer research on AI ([Mende et al. 2019](#); for the exact replacement choice stimuli, see Web Appendix F). Finally, participants answered background questions (e.g., gender).

Results

Pretests

Separate pretests supported the validity of our offer type and agent type manipulations. The pretest of agent type assessed the extent of perceived anthropomorphism (i.e., humanlikeness) for each agent. Using the same three-item humanlikeness ($\alpha = .86$) and three-item uncanniness ($\alpha = .89$) measures from our previous studies, a pretest of 100 MTurk respondents revealed that the humanlike (vs. machinelike) agent was perceived to be higher in humanlikeness ($M_{\text{machinelike}} = 1.65$, $SD = .83$; $M_{\text{humanlike}} = 2.47$, $SD = 1.07$; $F(1, 98) = 18.05$; $p < .001$) but not in uncanniness perceptions ($M_{\text{machinelike}} = 1.76$, $SD = 1.13$; $M_{\text{humanlike}} = 2.07$, $SD = 1.51$; $F(1, 98) = 1.35$; $p = .25$; additional pretest details and offer type pretest available in Web Appendix F).

Offer satisfaction

The satisfaction index was submitted to a 2 (agent type: machinelike AI, humanlike AI) \times 2 (offer type: better than expected, worse than expected) ANOVA. The main effect of offer type was significant ($F(1, 396) = 301.19$, $p < .001$, $\eta^2 = .43$) and the main effect of agent was not significant ($F(1, 396) = .03$, $p = .87$, $\eta^2 < .01$). Consistent with our theory, we also found a significant interaction between agent and offer type ($F(1, 396) = 10.14$, $p = .002$, $\eta^2 = .03$). In the better-than-expected offer condition, satisfaction with the offer was higher in the humanlike agent condition ($M = 5.79$, $SD = 1.31$) than in the machinelike agent condition ($M = 5.29$, $SD = 1.21$; $F(1, 396) = 5.62$, $p = .02$, $\eta^2 = .02$). As predicted, we found the opposite pattern in the worse-than-expected offer condition. Satisfaction was higher in the machinelike agent condition ($M = 3.15$, $SD = 1.84$) than in the humanlike agent condition ($M = 2.69$, $SD = 1.59$; $F(1, 396) = 4.55$, $p = .03$, $\eta^2 = .02$, see [Figure 4](#)). This pattern is consistent with our theory, providing direct support for H3.

Figure 4. Offer Satisfaction as a Function of Offer and AI Agent Type (Study 3b).

Notes: Error bars = ± 1 SEs.

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Choice of agents

Offer type (0 = worse than expected, 1 = better than expected), agent (0 = machinelike, 1 = humanlike), and agent replacement decision (1 = replace, 0 = remain) were contrast coded and submitted to a binomial logistic regression. We found a significant main effect of offer type ($\chi^2 = 10.34$, $p = .001$) and a significant main effect of agent ($\chi^2 = 9.25$, $p = .002$), both subsumed by a significant interaction between agent and offer type ($\chi^2 = 12.41$, $p < .001$). Further chi-square

directional tests were conducted to assess the simple effects of agent type at each level of offer type. A worse-than-expected offer led to a significantly higher proportion of replacement decisions in the humanlike agent condition (83%) than in the machinelike agent condition (63%) (one-sided test, $p = .001$; two-sided test, $p = .002$). In the better-than-expected offer condition, the proportion choosing replacement in the humanlike agent condition (28%) was lower than the machinelike agent condition (40%) (one-sided test, $p = .04$; two-sided test, $p = .07$). This pattern is consistent with our theory and demonstrates that humanlike AI is more (vs. less) likely to result in a continuation of the marketing relationship in the case of an offer that is better (vs. worse) than expected. Thus, we demonstrate that utilization of an appropriate AI agent leads to stronger relationships with that agent, which is a critical factor influencing customer retention and relationship management.

Discussion

Study 3b demonstrated that consumer response to better than expected and worse-than-expected offers are systematically influenced by the administering AI agent. Consistent with our theory, we found that a better-than-expected offer elicits greater satisfaction and reengagement when administered by a humanlike (vs. a machinelike) agent. These results are particularly important for companies utilizing AI as direct points of customer contact, with implications for the application and depiction of AI agents.

General Discussion

The present research investigates how consumer responses to offers that are discrepant from expectations depend on whether the administering marketing agent is AI or a human. Our theoretical framework proposes that in the case of worse-than-expected offers, consumers respond more positively when dealing with an AI agent versus a human or more humanlike AI agent, in the form of increased purchase likelihood, satisfaction, and reengagement. In contrast, for better-than-expected offers, consumers respond more positively to a human or more humanlike AI (vs. machinelike AI) agent. Moreover, we propose that this pattern emerges because AI (vs. humans) is inferred to have weaker benevolent and selfish intentions, which in turn influences offer responses.

A series of five studies provides support for our theory across product and service contexts. In each study, an expectation-discrepant offer administered by an AI agent elicits a different response relative to an identical offer administered by a human or more humanlike AI agent. Study 1a demonstrates in a product purchase context that consumers are more likely to accept worse-than-expected offers from an AI agent than a human agent. Study 1b examines the other side of our effect and demonstrates that consumers are more likely to accept better-than-expected offers from a human agent than an AI agent. Study 2 reveals that the effect is driven by stronger inferred intentions on the part of human versus AI agents; that is, stronger benevolent intentions in the case of a better-than-expected offer and stronger selfish intentions in the case of a worse-than-expected offer. These intentions, in turn, alter consumer response. Study 3a reveals that an anthropomorphized (vs. a machinelike) AI agent leads to a lower acceptance of worse-than-expected offers. Finally, Study 3b examines how the physical embodiment of AI (i.e., a robot form) influences anthropomorphism, with implications for responses to discrepant offers. Administration of a better-than-expected offer by a humanlike (vs. machinelike) AI results in higher satisfaction and reengagement intentions. Together, these findings contribute to the literature examining human–AI interactions and technology in marketing, in particular those areas examining

preference, service, satisfaction, and anthropomorphism, while identifying important implications for consumers and marketers.

Broad Implications of Differential Responses to AI Versus Human Agents

Our works reveal that fundamental differences exist between the interpretation of negative and positive outcomes administered by AI versus human agents. The underlying mechanisms of perceived intentionality apply to a broad range of interactions beyond just the price discrepancies in our present work. Given this, other marketing and nonmarketing contexts that deal with the administration of negative and positive outcomes will likely demonstrate similar patterns of results as those proposed by H1–H3. For example, consumers are commonly faced with unexpected delays or cancellations (e.g., flights, lodging stays, package deliveries), personal evaluations that differ from expectations (e.g., work performance, credit scores), discrepant financial offers (e.g., loan interest rates, credit line amounts), and unexpected school admissions and workplace hiring outcomes, in addition to a broad range of other contexts in which AI plays an increasingly common and customer-facing role. Future research could also examine if the perceived fairness of an offer is affected by the type of agent. For example, the positive or negative response to unexpected offers (e.g., an unexpectedly low or high loan interest rate) may polarize more extremely when administered by a human (vs. AI) (for initial evidence in support of this prediction, see the supplemental analysis of Study 2 in Web Appendix D). Future research could further examine the role of perceived fairness in explaining how perceived intentions influence offer acceptance.

When and How Marketing Managers Should Use Human Agents Versus AI Agents

Two particularly important marketing implications stem directly from the present research, both rooted in the ongoing transition within firms from human agents to AI agents as marketing representatives. First, our findings give insight into how this transition can be systematically and selectively managed to improve customer purchase tendencies, satisfaction, and reengagement. Indeed, whereas extant works regarding customer-facing AI have revealed primarily main effects of human-to-AI transitions on consumer engagement—that is, either humans or AI are generally superior in a given product or service domain (e.g., [Longoni, Bonezzi and Morewedge 2019](#); [Mende et al. 2019](#))—our work reveals that the nature of the transaction (i.e., offers that are discrepant from expectations) is important. In other words, our findings inform when and where the transition should occur in product and service offer situations involving discrepant expectations. Managers could apply our findings to prioritize (vs. postpone) human-to-AI role transitions in situations where better-than-expected (vs. worse-than-expected) offers are more frequent and impactful. In addition, our results suggest that even when a role transition is not holistically passed to an AI, the selective recruitment of an AI agent to disclose worse-than-expected offers should still be advantageous—that is, our results reveal that an AI “bad cop”/human “good cop” approach to managing discrepant expectations should have beneficial outcomes for the firm. Moreover, our research builds on brand crisis research that explores consumer response to algorithmic errors ([Srinivasan and Abi 2021](#)); however, our work reveals differences in perceived intentions, outside the context of algorithmic errors, related to whether an offer is administered by a human or AI.

Second, and perhaps even more impactful, our work has implications for firms that have already transitioned to consumer-facing AI representatives, including the multitude of online and mobile applications that use AI-based algorithms to create and administer offers (e.g., Myer's “6-second sale”; [Green 2017](#)). In such posttransition instances where AI is already customer facing, our

research reveals that AI may be depicted or otherwise framed as either machinelike or humanlike. Our manipulations show that this can be accomplished through differences in the embodied appearance of the AI (e.g., a robotic form shown in Study 3b). Moreover, the results of Study 3a suggest that the majority of contemporary consumers consider AI to be inherently machinelike (though Study 3a reveals that a minority of consumers do already consider AI to be moderately humanlike) unless humanlike imagery or verbiage is introduced. Thus, marketers should anticipate a default “machinelike” response toward AI agents unless specifically humanlike attributes are depicted. With this understanding, marketers should depict an AI agent as machinelike when disclosing a worse-than-expected offer but should depict more humanlike attributes in the case of a better-than-expected offer.

Ethical Implications

The aforementioned recommendations carry ethical implications, as our findings reveal potential opportunities and concerns for customer–firm relationships and consumer well-being. On the one hand, our work reveals opportunities for firms to receive due, and perhaps otherwise overlooked, credit for better-than-expected offers and potentially other behaviors that are ostensibly benevolent. On the other hand, regarding threats to consumer well-being, our work does reveal a tool through which marketers can increase the acceptance of worse-than-expected offers made to a customer, while also increasing intentions to reengage with the offending firm. In those instances where the worse-than-expected offer is objectively detrimental to consumers, the use of this approach does raise ethical concerns. By documenting these effects, we intend to benefit consumers and policy makers through strengthening their understanding of the nature of differential consumer responses to discrepant outcomes.

Importantly, we propose that this ethical dilemma predominately emerges in situations where consumers are ostensibly harmed—that is, where natural consumer resistance to unexpectedly high prices is bypassed by the selective use of AI. However, some situations do exist where increased consumer purchase would not result in objective consumer harm, and there are even select contexts where consumers and firms could jointly benefit from this effect. For example, consumers often hold unrealistic expectations for product and service offers due to self-serving biases or lack of information. For example, a customer could anchor on a historic promotional price ([Lin and Chen 2017](#)) or observe that another customer received a lower price offer without knowledge of that other customer’s greater earned loyalty status ([Mayser and Wangenheim 2013](#)). Such misperceptions or biased interpretations could lead consumers to irrationally abandon transactions that are objectively beneficial. In such cases, consumers and firms would benefit from shifting consumer tendencies toward preserving the marketing relationship, thereby minimizing switching costs and maximizing consumer utility. Thus, the current research indicates ways managers can strengthen their customer relationships through AI agents when these findings are applied ethically.

The results of our current studies reveal that most consumers currently tend to see AI as not inherently possessed of benevolent or selfish intentions when administering offers. However, there is the possibility that some consumers infer that humans within companies are manipulating AI offers behind the scenes or otherwise have programmed the AI to indirectly carry out selfish human intentions. In such instances, the observed increase in acceptance for worse-than-expected offers from AI agents could be attenuated. Exploring whether certain segments of consumers hold such

skeptical beliefs, or whether similar beliefs may increase over time as AI administration of offers becomes even more common, is a fruitful avenue for future research.

Anthropomorphism Theory

Our findings also contribute to the literature on anthropomorphism in product marketing and technology. Our research reveals that anthropomorphism of AI agents—that is, making AI agents more humanlike—can actually lead to decreased preference and increased disengagement. This is in contrast to previous research, which has shown predominately positive consequences of anthropomorphized products in the form of increased consumer engagement and product liking ([Aggarwal and McGill 2007](#)). Whereas extant research suggests that humanlike AI is more comforting and trusted ([Longoni, Bonezzi, and Morewedge 2019](#); [Waytz, Heafner, and Epley 2014](#)), our findings reveal situations where humanlike AI may serve as a liability for maintaining the marketing relationship, particularly in contexts of discrepant expectations. Future research should explore other psycholinguistic and personality psychology factors incorporated into AI agent design (e.g., altering the gender or perceived cultural origins of the AI) and resulting changes in consumer perception and reactions.

Beyond contextual effects due to AI design elements, our research also indicates that consumers individually vary in their tendency to anthropomorphize AI agents, with subsequent implications for consumption. Our results reveal that individual differences in perceptions of technology anthropomorphism moderate offer acceptance in cases of worse-than-expected offers (Study 3a). Managers should consider integrating trait measures of technology anthropomorphism when developing consumer marketing segmentations relevant to AI interactions. Moreover, it is possible that other consumer-level personality traits will influence consumer–AI interactions (e.g., big five personality factors)—a potential topic for further research.

149. [Creativity, business and society in the age of AI](#)

AI will fundamentally change advertising and marketing, industry verticals, and society at large. Private, university, and public research has contributed to steady progress in AI, but awareness of this technology’s potential blazed into the public imagination with the release of several generative AI tools. This drove rapid adoption—faster than any previous technology—and made clear that individuals, enterprises, and society would have to reckon with the impact of generative AI. The latest AI tools are probabilistic engines that generate human-like language, images, and video. They, like analytical AI and other applications of machine learning, operate using a trained neural network. Because they excel in a specific area, these are artificial narrow intelligences (ANI) as opposed to the artificial general intelligences (AGI) that replicate human-level intelligence and are, perhaps, on the horizon. Despite their limitations, AI have proved invaluable to many fields—notably science, coding, business, and media. Given that generative AI can produce art, copy, and code, the advertising industry must engage with these engines, and Ogilvy has been on the leading edge of that. We have explored a range of generative and analytical AI in order to serve our clients better, and we have learned that the incorporation of it into advertising and marketing will not herald the death of the agency or the sunset of human creativity. Instead, AI will lead to a creative and strategic renaissance. AI will spur better ideas and deeper insight by speeding up creative iteration and mechanizing aspects of execution and production, freeing creative and strategic

minds to focus on big ideas and solutions to client problems—to, in short, imagine. The legal and ethical aspects of AI are unsettled, and Ogilvy will always err on the side of caution; we will respect the rights of artists and the confidentiality of client information. Analytical AI is already embedded in performance marketing and the marketing tech stack, and as it advances and couples with generative AI, agencies and clients will be able to personalize and scale with better precision, speed, and efficiency. Realizing the gains of AI will require better collaboration inside of agencies and between agencies and clients. Fortunately, AI will help here, too, and while this new era is likely to result in job changes and even losses, industry growth and new professions will, ultimately, lead to better outcomes for our people. Disruption will hit all of society, and few businesses will be immune. Three hundred million full time jobs are exposed to automation worldwide, and two-thirds of current occupations are susceptible to some degree of collaboration with or replacement by AI. However, productivity gains will ensure those displaced by AI will find re-employment and be part of a significant economic boost. Since the field is rapidly evolving and the stakes are high, enterprises need a framework for integrating AI into their businesses. AI can help interpret, interact, create, operate, and decide. Individual businesses will explore which of those functions are best suited for their needs by comparing potential business value with the feasibility of the solution and managing the change in three areas: marketing, technology, and organizational dynamics. Society, too, must work out how to integrate AI. The technology is developing faster than our ability to adapt—especially at the level of legislation, policy, and governance. This has left the AI community policing itself and shaping the narrative around regulation, which is problematic. As the innovation and energy in AI has shifted from academia to industry, several big players have emerged: Google, Microsoft, and Meta. It appears that, for the time being at least, they will control this powerful technology, how it develops, and how we interact with it. Their for-profit status complicates the push for safer development, and that is cause for concern. After all, AI that is poorly aligned to human values, desires, and priorities may be an existential threat. Nevertheless, AI can do enormous good. It can help mitigate (or, dare we hope, solve?) climate change, revolutionize medicine, lift billions out of poverty, improve food security, and much more. If there's a problem, even a hard one, AI can help us solve it. Along the way, we'll raise a new generation of people who have grown up in a world where AI is a constant companion. These AI natives will be the ones, ultimately, to show us how we all will adapt to this powerful force we have unleashed. Artificial Intelligences (AI), like the people who created them, are interplays of light and dark. Digital creatures of great power and potential, they can entrance and enhance humanity. Generative AI like Chat GPT and Stable Diffusion have stormed through education, the creative industries, and media, and their output feels a bit like magic. The inclusion of a conspicuously labeled paragraph of AI-generated writing is a trope in the thousands of think pieces being written on the subject as are the clearly AI-generated ad images that seem, for now, novel. These clumsy early uses of AI will give way to its seamless integration into our personal and professional lives, helping us in ways prosaic and profound. From taming inboxes and simplifying our daily lives to improving logistics, making medical and scientific breakthroughs, and everything in between, AI will remake our world. Humans have adopted these new tools faster than any technology in history because, in part, the benefits are easily glimpsed and vast. So are the perils. AI, in the popular imagination, might rid itself of its creators, use our metabolisms for energy, or turn the world into a giant paperclip factory.⁰² Less fantastical worries are still vivid: wholesale job loss and transformation, metastasizing disinformation and propaganda, and handing the keys to our world over to entities that may soon surpass our capabilities—and see us as surplus. We must also grapple with risks of emergent sentience, should that happen and our ethical

responsibility and vulnerability to it. And just as unconstrained nano machines could turn the world into grey goo, unrestrained AI could bring about a deluge of mediocre content, drowning out anything truly original—a giant reversion to the mean that would suck the life out of culture. It could also perpetuate the bias long present in human society, which is a flaw, of course, that pervades what AI is trained on. These worries are real enough that leading experts in AI and digital technology issued in March of 2023 an open letter suggesting a pause in giant AI development and a refocus on, “making today’s powerful, state-of-the-art systems more accurate, safe, interpretable, transparent, robust, aligned, trustworthy, and loyal.” Caution makes sense when dealing with technology that has existential impact, yet we are conducting a civilization-wide experiment with AI. Investment in the space has moved from academia to the private sector,⁰³ where it continues to make a great business case for its ongoing development, while being free from the constraints of institutional research. After all, we’re all talking about it, licensing it, using it, and reformatting our businesses around it. As Mark Read, CEO of WPP, put it in *The Guardian*, AI “is fundamental to WPP’s business in the future.” There’s no doubt about that. AI is poised to revolutionize creativity, becoming as essential a tool as digital image and video processing. It will occasion a similar restructuring of creative talent, raising the premium on originality and innovation at the expense of more mechanical execution, while giving rise to new creative subskills like prompt engineering and model training. AI will transform strategy and account management and will make it easier to get to breakthrough, well-researched strategies while easing the friction in the agency/client relationship. AI will bring about leaps in efficiency in production, media, and hyper-personalized delivery. It will up-end the whole search economy and make the race for the data AI scrapes first (AIEO, perhaps?) a whole new subindustry. And all that? That’s just one industry. Elsewhere, pioneering AI engines like IBM’s Watson are already remaking everything from coding and memo writing to healthcare and law. Agencies and clients alike must think deeply about the ethics of AI and its use and what our responsibilities are to consumers. Despite the pleas of leading AI firms for oversight, governments will not be able to keep up with the technology, and until regulations have caught up, it’s up to us to uphold our honor. We must also anticipate our obligations in an evolving AI legal environment. This is no easy task, and we will err. So will our competitors and our clients. We will also benefit enormously and will find competitive advantage in the ethical, shrewd, and carefully considered use of AI—but only if we go in with our eyes wide open.

OGILVY 13 *The Art of Trending*—Woods Art Institute Art is born of its time, and part of its power is the conversation it invites between art and culture. Sometimes that dialog is eternal, but as the world speeds up, art has a place in the rapid-fire news cycle, too. That’s where the Woods Art Institute came in. With Ogilvy’s help, the Institute launched an experiment in September 2022 to connect art to the topics of the moment. The campaign entitled, “The Art of Trending,” took Twitter’s trending topics and used it to prompt DALL·E 2 to create the most contemporary of contemporary art—an exhibition curated entirely by social media users, executed by AI, and displayed OOH—that surfaced the role generative AI will have in art and culture. So, what is AI anyway? “You can go crazy thinking about all the possibilities, because these are very, very powerful technologies.... AI is the most profound technology humanity will ever work on.... I think it will get to the essence of what humanity is.” —Sundar Pichai⁰⁴

Hands-on exploration with AI is the best way to understand in your guts how transformative it is, but for those who have been working with it for a while, that sense is old news. They point out that the technology has evolved consistently; the world at large is just now catching on. After all, in a feat of natural language processing, IBM’s AI Watson beat the best human champions on the game show *Jeopardy!* all the way back in 2011. The explosion of AI into the collective consciousness is due to a breakthrough

in accessibility, not a revolution in the field. The computer itself provides a good metaphor. Computers quietly enhanced efficiency in the background for a long time before they suddenly seemed to be everywhere, and for that, we can thank the graphical user interface. That took a technology that required a lot of specialized knowledge and turned it into one that anyone could use. Generative AI has done the same thing for machine learning. For all the simplification that the new tools have brought, understanding how AI fits in our world still requires a grasp of what AI is. AI combines huge datasets with computer processing to create inorganic systems that can solve complicated problems. These systems sometimes (but not always) appear human-like in the way they approach and resolve problems. They often meet or exceed human problem-solving capacity. For the sake of not getting tied up in philosophical debate about sentience, self-awareness, or cognition, we refer to them as intelligences since they act like intelligent entities: They learn from their inputs (their “environment”), reason, generalize, perceive, communicate, and evolve—sometimes in unexpected ways. The most sophisticated in a long line of assistive tools invented by humanity, AI are likely to be our partners, for good and ill alike, in most aspects of life. As Ogilvy’s executive creative director and experience creative lead EMEA David Raichman puts it, “The first social unit that will appear—even before the family—will be the human and a generative AI partner.” But if we delegate all of our tasks to it, we will become passive recipients of culture, not its creators. Instead, we use AI as a “sparing partner,” in Raichman’s memorable phrase, “that will tempt us to create in a new way, creating a new form of art and a new form of advertising,” that could not be created before. Raichman’s Ogilvy colleague Roberto Fara, chief creative officer Spain and global creative experience lead, puts it like this: “Generative AI can imagine new things that our minds cannot right now achieve.” At the center of it all, both Fara and Raichman believe, lies the idea, and that, for now at least, remains the province of the human. “Machines don’t have creativity yet,” Fara says. “They cannot answer if something is good or wrong. They don’t know what it feels like to travel, to taste a tomato.” They lack, to use the technical term, qualia: introspectively available moments of subjective, conscious experience. But since we do, imagine the potential of these tools for our business and that of our clients. “One of the biggest challenges as a creative agency,” says Ab Gaur, Ogilvy’s global chief data and technology officer and the founder of Verticurl, “is scaling our smartest people and the work they do. If we could, we could have more impact in the world for our clients, creating brand experiences and moments that AI will help us execute.” Understanding AI Scientists create AI using machine learning, especially a subset of that called deep learning that takes place in artificial neural networks. In essence, these systems analyze large amounts of data using algorithms that mimic the human brain to make predictions or decisions, and they are broadly classified as artificial narrow intelligence (ANI), artificial general intelligence (AGI), and artificial super intelligence (ASI). ANI is a weak AI, meaning that it can perform specific tasks. AGI is a strong AI that is similar in ability to a human, while ASI would surpass us. Though remarkable, the current crop of AI are all ANI.⁰⁵ There are several types of AI. The one that’s getting all the attention now, generative AI, is either a text-to-image model or a large language model (LLM). The latter has been fed an enormous dataset of human knowledge in the form of text, images, or both. Text-to-image models, such as Midjourney or Stable Diffusion, use pairs of images and the text descriptions thereof to predict the kind of image a given natural language prompt should produce. It then applies some data noise into this probabilistic engine to produce original, high quality images. LLMs work similarly. They use the billions of words on which they’ve been trained—and all the biases, intolerances, poor behavior, and unrepresentativeness encoded in them—to form predictions about what word is most likely to appear next in a series, a task at which it far exceeds

human capacity. They are, to quote linguist Emily M. Bender, “stochastic parrots”—probabilistic content generators that have no ties to meaning. These systems are designed to mimic likely human responses and persuade us to believe them. LLMs are, as many have pointed out, A+ bullshitters, and that is one of the reasons they appear so sentient to us. We apply our own theory of mind to them and, as Bender said to reporter Elizabeth Weil in New York⁰⁶, “We’ve learned to make ‘machines that can mindlessly generate text...but we haven’t learned how to stop imagining the mind behind it.’” That said, LLMs continue to display emergent behaviors (also known as agentic behaviors) that their designers did not and could not anticipate, which complicates the picture. While generative AI has sucked up all the media attention of late, it’s far from the only type of AI. Neural networks and machine learning have been used to form everything from specialized expert systems to recommendation engines and from fraud detection to logistics load balancing. They’ve integrated with robotics, computer vision, facial, speech, and audio recognition, and the natural language processing (NLP) that is most familiar. One specialized AI, AlphaFold2, took a mere 18 months to crack one of the hardest problems in biology⁰⁷: predicting the structure of nearly every protein known to science. This breakthrough will lead to new drugs, improve treatment outcomes, and contribute mightily to basic science. AI is already helping with resource allocation, personalized marketing, efficiency boosts, and even strategy. AI already has a years-long history with marketing and advertising through analytical AI engines enhancing sales enablement, CRM, personalization-at-scale, customer behavior prediction, and more. One way through this thicket is to see AI in three big buckets, as Dickon Laws, global head of innovation for Ogilvy, does. The first is generative, which will produce a golden age in creative expression and speed the production of personalized, even atomized, assets. Then there’s the analytical bucket. It powers marketing automation and sales enablement, enabling us to connect communication to context at the individual level and work within a rich landscape of triggers and behaviors. The third is what Laws calls novelty. This is where AI becomes invisible, disappearing into the background as it delivers a holistic experience that, to quote Arthur C. Clarke, “is indistinguishable from magic.” AI adoption AI has launched think-pieces by the thousands in the past few years, but the uptick in hot takes corresponded to the hockey stick in adoption that happened after the release of ChatGPT, a chatbased generative AI from OpenAI. Now embedded in Microsoft’s Bing search engine and soon to roll out more broadly, ChatGPT focused the public’s mind on the potential (and peril) of generative AI. The hubbub pushed AI development out into the open and turned it into something of a race. A massive burst in adoption followed. Two months after its release, ChatGPT reached 100 million users—faster than any technology in history. The AI market is projected⁰⁸ to increase from just under \$200 billion in 2023 to \$1.8 trillion by 2030, and that’s probably conservative. Even before the public’s imagination caught up, however, enterprises were well on their way to making AI an essential part of their businesses. IBM notes in its Global AI Adoption Index 2022⁰⁹ that global adoption of AI continues to grow steadily, and it now stands at 35%. That relatively modest figure obscures that, “in some industries and countries, the use of AI is practically ubiquitous.”¹⁰ Business is using AI for everything from memo writing to process automation. In fact, AI governance will join cybersecurity and compliance as a board-level topic. Data from Forrester shows that 46% of data, analytics, business, and technology decision-makers seek out partners to implement AI critical to the business¹¹. That said, McKinsey & Company¹² found in its annual survey of companies that AI adoption, after doubling since 2017, has largely plateaued. Companies that have adopted AI, however, are “realizing meaningful cost decreases and revenue increases.”¹³ Accenture is much more bold, claiming that AI will increase the developed economies’ productivity by 50% in the next two decades¹⁴. AI development Bill Gates gave Open

AI, the developers of ChatGPT, a task. He thought it would keep them busy for two or three years, but it took them only a few months. This AI flashover has propagated throughout the space and ignited the public's imagination. One imperfect measure for the complexity, and therefore the potential, of an LLM is the number of parameters in the model. At 170 trillion parameters, the model for GPT-4 is 100 times larger than its predecessor, and, unsurprisingly, vastly more powerful, too. It's made news for acing Advanced Placement tests and the Bar Exam while polishing off benchmark test after benchmark test with flying colors. LLMs are already working their way into most of the apps people use every day. Microsoft is introducing AI into its Office suite of products. Google is, too, but so are uncounted developers using LLMs as a spine for a bewildering array of AI-powered apps. It's going the other way, too. OpenAI has launched a plugin service, instantly turning their LLM into a platform hosting travel recommendations from Expedia, restaurant reservations from OpenTable, and shopping enablement from Klarna—and that's just the beginning. Amazon, too, is in the platform game, enabling customers to build and scale generative AI applications on a range of different models. The latest generation of AI is also showing increased flexibility, which means these can perform multiple tasks, accelerating scientific research, and, like any good overachiever, self-improving. Image generators like Stable Diffusion, Midjourney, and DALL-E-2 are refined enough to produce professional-looking work. The same is true on copy side of the house with tools like ChatGPT-4, Jasper, and Hemingway. AI coding assistants, such as Codex, CoPilot, and CodeWhisperer, are growing in sophistication and popularity. According to Forrester Research, AI will write 10% of the world's code in 2023.¹⁵

Art. Copy. Code. If the penny hasn't dropped yet, here's the import: the major functions of many businesses—including creative ones like advertising and marketing—can now be done at a passable level by AI, and that means standing out will be harder than ever. As AI engines become commodities, which they will¹⁶, the kind of out-of-nowhere creativity that spawns breakthroughs will be ever more in demand. Marrying that uniquely human ability to a suite of powerful AI tools will produce more (and more remarkable) creativity. Relying on the machine alone will produce a sea of mediocrity. Is this the end of creativity? Or the beginning of a golden age? A German artist named Boris Eldagsen won the creative open category at the 2023 Sony World Photography Awards, an honor he declined after revealing that his prizewinning photograph wasn't what it said on the tin. His image, which emerged on top of 415,000 entries, was generated by AI. Eldagsen, in a statement, said, "Something about this doesn't feel right, does it?"¹⁷ No, it doesn't. This is proof positive that if even a panel of the world's premier photography experts can't tell the difference between a photograph and the work of AI, then human creativity is dead. That's the easy answer. And the wrong one. Eldagsen, a world-class photographer, created the image to spark a discussion in the world of photography about the impact of AI and the definition of what was—and was not—photography. Not only did he succeed beautifully in that aim; he also showed that the world of creativity is not in the incorporeal hands of AI. Rather, it lies in the mind and expertise of gifted artists and writers who now have a powerful new tool to extend their creativity. AI isn't the death knell for creativity. It's a renaissance.

Creating with AI Imagine you're in a scriptorium as the 15th century comes to a close or an ad agency creative department as the '80s did. A powerful new tool debuted—the printing press for those early modern monks and Photoshop for the creatives who were listening to this song without irony—and with its arrival, you felt your world shift. Both of those tools brought about a flowering of creativity, stretching the bounds of what humans could do. So it is now with generative AI. Generative AI threatens to dethrone humans as the kings of creativity, but keep in mind Elizabeth Bender's message. These systems have been trained to produce human-like responses, and while their work may appear creative,

they generate it out of a dance of diffusion and probability that is divorced from meaning. It seems creative without actually being so, because creativity is born of meaning. Who cares, right? So long as the output accomplishes the job, what difference does it make if the machine knows what it is doing? When it comes to the more mechanical parts of creativity—the test runs of ideas, the variations on a theme, the stimulus to get the creative juices flowing—that question of meaning doesn't matter a bit. Nor does it matter at the other end of the process, when fully realized creative work is tweaked for multiple environments or hyperpersonalization. Though done by people now, that is work that can, and probably should, be done by machine. What about the people? We'll come to that, but first let's take a look at the three different futures the Harvard Business Review believes generative AI might bring the creative world. 1. The AI partner. In this outcome, "AI will support humans to do the work they already perform." It would just be faster, easier, and cheaper to produce. Prompt engineering—the art of getting what you want out of the AI—will become the only crucial skill, and AI-generated art, copy, and code will flow like the Nile, fertilizing creative departments and even all of advertising and marketing. 2. The AI master. "Unfair algorithmic competition and inadequate governance" crowds out human creativity in this scenario, leading to a flood of work competing for attention and driving the costs of creation down so far that humans become an uneconomical, inefficient relic. 3. The human boutique. Overwhelmed with algorithmically generated content that just isn't good enough, people turn toward the human-made variety, especially since humans, in this possible future, maintain a creative dynamism machines can't match.¹⁸ We believe the future is far more nuanced than that. We are deeply engaged with all forms of generative AI, and the near-term seems clear: AI will augment human creativity—profoundly—but the organic mind will be the source of the breakthrough idea, the creative leap, and the work that rises above A CREATIVE RENAISSANCE the clutter. As David Raichman puts it, "Creativity will be empowered by the machine and won't be replaced by it." Generative AI lets anyone turn ideas into writing, images, video, audio, and code using nothing but words. It can take a script and turn it into a mockup film in just hours. New tools (and it seems absurd to call out these bleeding-edge ones as "new" when the "old" ones haven't hit their first birthday) are now able to generate new images and videos from visual references, not just written ones. Ogilvy is using generative AI to go beyond the boundaries of what humans can achieve alone. "The magic occurs," says WPP's Stephan Pretorius, "when you combine human insight—and cultural insight—with this ability to create content with machines." "Here, with all the dogmatism of brevity," as David Ogilvy wrote, is how we do it. Build new teams. We have relied on creative teams from the dawn of the creative revolution, but no longer will they be an art director and copywriter working as a pair. To that, we now add AI, and more. These teams will grow and contract according to the demands of the project, and they will seamlessly include people from outside the traditional creative enclave: strategists, coders, account leads, and anyone in the organization who can contribute. For these teams to unleash the power of AI, they, "need to explore, research, play, and learn. They are learning a new language," as Robert Fara suggests. But what is that new language? Prompt engineering. When a creative person sits down to produce something, they do so by creating a piece of visual art, writing a block of copy, crafting a bit of code, or designing a strategy. Describing that task The 7 creative commandments for generative AI to a machine using very specific words is, Fara says, "when it turns into a nightmare." Some can deconstruct their creative process into a description that a machine can follow, and they—and the others who can learn this skill—will become a vital new part of the creative workforce: creative prompters. These will be the people who can play generative AI like an instrument, eliciting from it the beautiful realization of the notion in their hearts, and they will need to be given room to learn,

to play and, for the first generation at least, define their very profession. AI isn't creative. It can only work with what we give it. If we ask for a picture of an apple, we'll get something serviceable. If, instead, we ask for a photograph of an apple shot with a Summilux lens on grainy film in the style of a Surrealist version of Man Ray, we'll get something more interesting. And if that careful description is paired to a creative concept, perhaps "fruit this good is so rare it might as well be unreal," and a strategy that animates the brand at its best, then we are on to something that may be useful to the brands at its best. Then we are on to something that may be useful to the brands in our care. In other words. AI is in thrall to the big idea, just like we are. Become a connoisseur. A CREATIVE RENAISSANCE "Just as the internet democratized information," says Antonis Kohelis, president of advertising for Ogilvy, "generative AI is democratizing inspiration." It takes no leap of imagination to picture what that means. The internet flooded us with disintermediated information, much of it raw, irrelevant, or just plain wrong. Generative AI will drown culture in a tsunami of mediocrity. Trained on what exists, not on what has yet to be imagined, the output of generative AI will steadily regress to the mean. You can already see it. The Midjourney- or Stable Diffusion-generated image is already something of a trope in blogposts and PowerPoints. To counter this, we must develop a talent strategy that prizes discernment everywhere in the organization: creative, account, and strategy. Ogilvy's mantra of Divine Discontent no longer just applies to our own performance. It applies to what we work with AI to create. Because these engines are able to produce carefully crafted output, we can be lulled into praising soulless executions and not pushing ourselves hard enough to uncover the dramatic idea that should animate it.

"AI is force multiplier for creative expression." That's David Raichman's phrase, and he's right. By treating these inorganic intelligences as navigators into the land of possibility, we can uncover dimensions of our ideas we simply did not have the time or energy to explore before. That's not laziness; it's a function of our biology. The human mind is a pattern-recognizing machine, and it is ruthlessly efficient in pruning away that which is extraneous to the task at hand. As good as creative people are at opening their minds to serendipity, even their mental hardware innately edits out countless possibilities before they ever rise to the surface of their thoughts. AI, unencumbered by meaning or judgement, can propose iterations our minds would have never found. Protect artists and brands. AI will create economic upheaval for creative people. A whole layer of creative output may be wiped out as agencies automate as much of the mechanistic work of versioning, personalizing, and production as possible. Jobs will change, and, yes, some will be lost, but new opportunities will open as well. We will enhance those opportunities and nurture artists. The output of AI trained on uncompensated work is off-limits to us. Not only does it pose legal issues for us and for our brands; it steals from creators. We will train AI on our own work and use engines trained on datasets composed of rightfully compensated work such as those from stock houses and individual artists. This is a thornier problem than it seems at first glance since all LLMs are trained on datasets scraped from the internet, which, naturally, includes copyrighted work. Even fine-tuning and training generative AI may layer on top of existing training of uncertain provenance. Since legal and ethical issues remain unresolved, we will take the most conservative approach. We will also take care with what we tell generative AI. At present, many of the engines scrape and store the content of prompts, and we will never compromise client confidentiality by being careless with them. Speed production and personalization, not creation. Much of what is done in the production phase will be automated. Production work will move from production companies to agencies where it will join personalization and versioning in being done by machine. So will market research. Some of this work won't involve the agency at all and will, instead, be done

directly by clients. This will increase efficiency and cut costs. Rob Hill, chief executive officer, Ogilvy Social.Lab Brussels, recalls shooting “for 19 days to get the right packaging across 18 countries in Africa.” With AI, “You can change logos, packaging, and make things relevant very quickly.” AI-enabled market research will speed up response to creative stimulus and validate the work at the same time. It can also aggregate huge quantities of market feedback for creatives, expediting fine-tuning and cutting back on rounds of review. This leaves Ogilvy the freedom concentrate our efforts on our creativity and our skill so that we can work in partnership with AI to create unmistakable value across the spectrum of creative, from strategy to assets. Advertise your ethics. When is AI a legitimate addition to the creative process? When it is disclosed. When it doesn’t deprive creators of their rights. When it doesn’t court legal jeopardy for us or our clients. When it doesn’t deceive. We will be a beacon for how to use AI to reach new creative territory, uncover deeper human connection, and do so ethically. Scaling with AI Generative AI allows us to scale our talent. When we use these new tools to reduce the time we spend on repetitive tasks, we can increase the time we spend on craft, much in the same way that programs like Photoshop freed designers to spend more time exploring ideas instead of pasting up boards. Talent “If I can try 100 pictures in less than an hour, then I can spend more time thinking about the pitch,” says Fara. At the scale of Ogilvy and of our clients, he continues, “that’s a lot of money and a lot of time.” It can launch copywriters down more pathways in less time, broadening the exploration process. In fact, generative AI allows the entire organization to scale, boosting the productivity of account leads and strategists just as much as creatives. To quote Gaur, “It helps us scale the smart work done by our smart people.” AI additions to familiar tools like Photoshop and Illustrator, for example, dramatically accelerate creative output, especially in the production phase, but there’s another side of scaling. It has to do with what happens when great assets meet great data. Personalization One of the ways we’ll do that is by delivering relevant content to the right people in the right context at scale—something long discussed in marketing but imperfectly realized so far. This is the true potential of marketing automation and sales enablement, and a combination of AI engines are coming together to make that possible. “The A CREATIVE RENAISSANCE adjacent technologies are jumping into the space to equip us in industry in a new way,” say Hill. Advertising has many creative tools available, “to create beautiful images, content, and templates, etc.,” says Gaur. On the other end are the outputs: TVCs, brand experiences, dot com channels, mobile, social, and the like. In the middle is data. By combing them (along with powerful workflow tools), AI can assist in the production of personalized assets in real-time. Analytical AI can help here. An Adobe AI called Sensi can give marketers recommendations based on the performance of a similar campaigns, helping identify segments, targets, and individuals to engage with. That lets the agency make a better recommendation to the client in less time. Or consider the sales side and, for example, the Salesforce AI, Einstein, which can qualify leads, manage opportunities, and even provide lookalike targets for salespeople to approach. No matter the assistive AI, “it reduces the cost of operation for the agency,” Gaur points out, making us less expensive to the client while being even more effective. Collaboration With everything operating at greater speed, better collaboration is essential, and AI can help here, too. AI-enabled workflow management links the digital asset management, the analytical intelligence, and the people using them into a unified environment for real-time cooperation. Comms teams, marketing teams, social teams, and digital teams can come together in a single platform, and that streamlines work and makes it easier to take in client feedback—leading to faster turnarounds and increased efficiency...and efficacy. Disconnected systems and teams are becoming a thing of the past. The press has been filled with worry about the human cost of this automation: “The people who were part of a repetitive task that

this automation takes away,” notes Gaur. But that doesn’t mean mass redundancies in his mind. Gaur sees a world where companies invest in making their people future ready, not just their tech. “There will be a lot of jobs out there that we haven’t even thought of yet,” he says. Growth in what has been a contracting industry will more than absorb any disruption. Strategizing with AI “Many of these tools are interesting for analysis: summarizing articles, research, and extracting key themes.” For planners, “AI is a productivity leap board,” or so says Hill. Strategizing and planning is a research and analysis-heavy part of our business, and that learning enhances inspiration, helping the agency get to the insights that underlie brand building efforts. Generative AI will occasion rapid change in strategy and planning, much in the same way the internet revolutionized those tasks starting in the ‘90s. The improvements fall in two categories: productivity and quality. “AI,” Hill says, “can help us as an industry accelerate and do basic things quicker.” He’s referring to category, consumer, audience, and journey research. Inorganic intelligence can chew through the laborious part of that by directing planners to key sources and answering desk research questions with useful summaries. Transcription, the bane of many a planner and account executive’s life, is now an AI afterthought, shaving off hours of mechanical labor. Just by automating the basic information gathering and analysis that enables insight, AI allows humans to spend more time thinking while still improving productivity and lowering costs. That’s essential in a business beset by margin pressure. Hill believes that if we embrace AI, Ogilvy can improve underlying profitability. We’ll “work smarter and have fewer people doing what we used to do.” Disruption will follow, of course, but perhaps that’s exactly what advertising needs to enhance its future viability, and growth, Hill joins Gaur in hoping, will absorb the impact on people. An upsurge in quality will come as Ogilvy integrates AI into planning and strategy. Beyond the obvious fact that planners will have more time to generate better ideas if they’re not spending time doing what a machine can now do, generative AI opens new paths to inspiration. With imaginative prompting, they can suggest new audiences, themes, or expressions. They can explain complex topics, allowing planners to connect dots through areas that were once opaque. AI can help people get unstuck, nudge them toward new avenues they may not have considered, and assist them in organizing their thoughts. They can suggest ways to improve writing, and that improves the clarity of our communications with each other and our clients. AI shines when it comes to finding just the right image to express an idea, designing a beautiful presentation, and even composing, performing, and creating a video for a song that livens up what would have been a boring topic—so long as people know how to use it well. Creatives aren’t the only ones who will need time to explore AI. Strategists, planners, and account executives do, too, if they’re to master this new technology. Formal training will follow when we get to the point where AI has redefined industry processes and led to bespoke AI-enabled workflows, but until then people need room to experiment and allowance for the time and costs of satisfying their curiosity. That’s how we nurture expert users and learn how to tell better stories faster and cheaper. As more employees use generative AI, incidents like this will become more common. A recent survey by Kizen found that 90% of workers earning over \$100,000 reported using AI in their work²⁰. In case the implication isn’t clear, that means AI is coming for white collar jobs—something you’ll learn more about in the next section. AI adopters have a downpour of how-to-use-AI content to help them do their jobs, from prompt templates and AI work hacks to breathless newsletters and databases of AI tools. No longer a specialized subset of the IT world requiring heavy training and investment, AI has shouldered into the workplace through platforms and public interfaces. Technology enterprises are striking partnerships to help them roll D And most of those jobs are in industry, not government or academia. The rest of the economy may not be so lucky. Three hundred million full time jobs are

exposed to automation worldwide, and two-thirds of current occupations are susceptible to some degree of collaboration with or replacement by AI²⁵. Fortunately, Goldman Sachs anticipates, “that many workers that are displaced by AI automation will eventually become reemployed—and therefore boost total output—in new occupations that emerge either directly from AI adoption or in response to the higher level of aggregate and labor demand generated by the productivity boost from nondisplaced workers.”²⁶ Lest you think this is Pollyanna-like thinking, consider that 60% of workers are currently employed in jobs categories that didn’t even exist in 1940. In other words, “over 85% of employment growth over the last 80 years is explained by the technology-driven creation of new positions.”²⁷ There’s ample precedent for the positive effect of disruptive technology, too. Goldman Sachs notes that both electrification and personal computing resulted in substantial productivity booms. Perhaps the confidence Gaur and Hill have isn’t misplaced. While the GDP impact from AI will be enormous, it won’t be evenly distributed. Judging by their investments, private investment has bet that the biggest payoffs initially will be in medical and healthcare; data management, processing, and cloud; fintech; cybersecurity and data protection; and retail.²⁸ But those aren’t the only industries to benefit. Making AI work for your business

The combination of just two foundational technologies—computer vision and natural language processing—provides nearly endless possibilities. The AI we already have offer so much more. Getting from that promise to the productivity and GDP gains on the horizon will involve a lot of questions, many of which, unfortunately, are still unanswered. The first, and most important may be, as Ashley Wood, global principal, brand innovation and insights at Ogilvy Consulting, asks, “Is AI truly business-ready yet? Do you really trust your business with it?” And, for that matter, how do you even make those judgements? How do you use it in your business and for your products? How do your employees use it to work better? What policies do you apply? Where do you place your investment now and in the coming years? And so many more. Yet, there is a way through the woods: while AI is disruptive in ways we don’t yet understand, it falls into a familiar framework. AI is the next chapter in the large-scale digital transformation that began at the end of the last century. As a result, some of the same ways of looking at change may help businesses adopt AI wisely. The first step is to look at what your business needs in light of what AI can do now and what is on the horizon. The core layer of machine interpretation is well developed (even while it continues to advance). While slightly more advanced, interaction is also substantially developed already. AI creation, as the mania surrounding generative AI demonstrates, still leaves people astounded, even though the tools have a long way to go to catch up to the hype. On the simpler end of the scale, autonomous operation is starting to come into its own, but reliable, full AI-driven mobility in complex environments is still in the future. AI decision making, too, remains immature, even if it is getting better fast. Consider BloombergGPT, a 50-billion parameter LLM built especially for finance. It’s likely the first in a series of domain-specific models that will help business leaders run companies better in the future. Rare, however, will be the company that can fund such an effort on its own. LLMs are hugely expensive to train, in both monetary and carbon costs. Choosing to build one from scratch might break the company budget while also putting a crimp in its sustainability story. And yet the temptation will be strong because the benefit to business decision making from having specially trained LLMs will be vast. So will the potential to sell access to insights born of the huge data sets large companies have. Every vertical will have its bespoke large language models that are better than the generic ones. Nevertheless, the existing ecosystem offers plenty for a company to access, and for Salmenkivi, this opportunity falls in three buckets: distribute, capture, and create. 1. Distribute—Businesses can license existing AI technology which they then exploit in a middleman model. They build it into their core offering

or create services or products that run on top of it. 2. Capture—Open market AI services can cut costs, improve products or services, or enhance customer satisfaction. With proper safeguards in place, staff can use existing platforms outright. Alternatively, a business could purchase a tailored AI solution or build AI agents on existing APIs to automate tasks in research, marketing, customer service, or e-commerce. AI can even help enhance a business’s own API. 3. Create—This is the most expensive option, and companies can choose to use some of what’s already created or elect to build it all from scratch—and everything in between. This provides the opportunity to develop custom LLMs, neural networks, and algorithms, which can fuel decision-making and insight. The outcome, or for that matter, the training sets and underlying hardware, can be sold as part of an AI-specific offering, not unlike how Amazon Web Services (AWS) emerged from Amazon’s internal IT systems. Armed with this broad view, a business can look more deeply into which AI applications offer the best combination of AI and feasibility. Christopher Brewer, president of Ogilvy Consulting in Asia, likes to consider if, “this disruption is going to change a leader’s world tomorrow or if it is something that has a longer tail to it,” and to determine that he’s built a framework and fleshed it out with examples from three verticals: marketing, B2B sales, and finance²⁹. A quick glance shows that a few things are emerging now—in Brewer’s words, “customer insight, finding audiences, finding leads...the stuff that fuels business today. That’s where AI is going to have an immediate impact.” Others, like CLV analysis, financial decision support, or strategy, may have huge potential for business but are further down the development line. The trick, Brewer believes, is to focus on the tip of the pyramid while waiting for the technology to catch up to the other tasks of high business value. Extracting that value requires change management in three areas: marketing, technology, and organizational dynamics. Before you freak out—and if you’re not a little nervous, you haven’t been paying attention—remember this: these are the early days and progress is slower than it appears. Sure, AI is going faster than the internet, but 30 years on from the introduction of the internet, e-commerce only accounts for 15% of buying and selling. People have been formulating the future for AI for over a decade now. IBM Watson, for example, debuted in 2010. It’s no stretch to say that ten or so years more will be needed for AI to mature in business. This is your moment to gain first-mover advantage, not the time to realign your whole enterprise to AI. Improving inter-corporate relationships That said, AI may soon be able to help your business get in tighter alignment with your partners. Building cooperation between two organizations, either for the purpose of M&A or just a client/ vendor relationship such as the one that powers advertising and marketing, is a complex problem. Systems have to be merged. Metrics shared. Individuals directed. Cultures meshed. Expectations set. The list goes on, but this is a place for AI to assist. One of the most challenging times between an agency and a client is during the first phase of working together. There’s a lot of friction, not because of bad feelings but rather because, as Dickon Laws says, “You’re bringing a bunch of new people together.” Not everyone on the client side will have been involved in the pitch, and they need to see that the company has made the right decision. On the agency side, people need to be “speed dipped into what the brand is,” as Laws rather vividly pointed out. A single AI, however, trained on the particulars of the pitch, the needs of the client, and the information gaps in the agency could smooth this onboarding process considerably. Such a vision suggests that AI could also be used, Laws suggests, to determine which agencies are a good match for the needs, culture, and talent of a client (and vice versa) and do so in a much more data-driven way than any un-augmented pitch consultant could muster. That AI could even predict the chances that each organization—client and agency—will end up in an alliance, allowing each to better apportion their resources. As the rapid adoption of AI makes clear, we, as a culture, have decided that the

present and future benefits of this technology outweigh its potential harms. Disruption is coming, and it will cut across nearly all industries. As AI integrates with robotics, that disruption will spread to verticals that may be spared the initial upheaval. Though productivity projections suggest that job losses and displacements will be absorbed by growth, that's little comfort to the individual who has been turned out on the street. Projections may be wrong, too. After all, the internet was expected to produce a massive spike in productivity, but it didn't alter the labor productivity curve much at all. W That's not the only worry. We are weakening the foundations on which shared information, authenticity, and veracity rest—and that comes on top of the damage that has already been done there. Given the economic incentives, it's unlikely we'll stop anytime soon, and even though open source AI engines like HuggingFace and Stability are in the market, “the way AI is going to work is through a competitive dynamic between [sic] Google, Microsoft, and Meta30,” as New York Times columnist Ezra Klein puts it. Governments and policymakers are awakening to the destabilizing force that is AI. China, mindful of its internal security and social placidity, has promulgated draft regulations that would place generative AI within the nation's censorship regime. Questions of copyright for AI generated work and usage rights for training data are working their way through the legal system at a rate seven-times higher than in 2016;32 the resulting decisions will have significant impact on how we use AI.33 Legislatures and parliaments are keen to weigh in, too. The speed of AI development and its uncanny imitative power will easily overmatch the glacial pace of government. From our creative agency standpoint, we worry about the tide of mediocrity that AI ensures will soon wash in, but from a societal point of view, the risk of high quality, magnetic, convincing, and even deep-faked misinformation is much more troubling. Recall that AI is designed to seem human and convince us of the authenticity of their responses. Allowing corporations that depend on the manipulation of people to wind up in effective control of that technology is foolhardy. To put it baldly, the better Klein's oligopoly of Microsoft, Meta, and Google persuade and manipulate humans, the better their financial performance will be.34 Therefore, they will optimize for that variable. Now imagine our polarized ideological landscape and the ubiquity of irresistible falsehoods. It doesn't take a great leap of logic to see that we need fear not a sea of sameness but rather an ocean of untruths. AI won't just corrupt the public's taste. It will rot its already-flimsy ability to discern truth. The AI-generated hit song featuring fakes of Drake and TheWeeknd is a catastrophe for intellectual property,35 but the right (or, rather, wrong) kind of AI-generated faux presidential video could be a threat to civic order. Consider, too, the environmental cost of AI. Training runs for LLMs use significant amounts of electricity, cooling, and, of course, electronics. Even one of the most efficient models, BLOOM, emitted 25 times more carbon than a flight from New York to San Francisco.36 Daily use can be even more costly to the environment. One estimate has ChatGPT using as much energy as 175,000 people in January 2023 alone.37 During its training runs, generative AI drank deeply from all the bias and hate humanity has vented into publication and the internet. “It's going to replicate those biases and going to tuck them away in a black box that makes them harder to uncover,” says Klein.38 They creep into the responses we get from generative AI, even if the prejudice is covert. As AI grows in popularity, its responses will shape normative ideas of race, gender, sexuality, and representation, further cementing corrosive biases just when society was beginning to deal with them. The filters and safeguards companies put on AI help, but they are not perfect. Clever prompt engineers have induced filtered AI to write porn and induce mayhem. Unfiltered or loosely filtered AI might be far more destructive. We just don't know. Why not? Well, Klein's mention of the black box is important. We know how AI is built but not what happens in its cold, silicon heart. This is the problem of interpretability. Researchers maintain that they don't know why their

algorithms do what they do, and that's one reason AI develops skills the designers never imagined. Until we can see inside the models, we can never adequately predict their abilities or be fully confident in their results. If AI is going to make HR decisions, cybersecurity improvements, financial transactions, resource allocations, and the like, we need to see how it is arriving at its conclusions so that we can judge the impartiality or correctness of its actions. We demand the same accountability of humans. Why not AI? Interpretability, Klein asserts, is a potent way to mitigate some of the prosaic dangers of AI—things like economic crashes, security meltdowns, biased hiring decisions, and more. It may be in the public interest, but it's not necessarily what the AI companies are after. The hard problems As you can see, even today's remarkable, but specialized, AI (ANI, for those of you who remember a few thousand words back) suffer from what are broadly defined as alignment problems—a gap between the AI's actions and human values, goals, intents, preferences, and principles. That's frightening enough. What happens when we achieve AGI—human-level inorganic intelligence? Poorly aligned AGI poses an existential threat, and AI business leaders and researchers know it. That's the impetus behind a May 30, 2023 statement that said, "Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risk such as pandemics and nuclear war." This isn't just public posturing, either. "P-Doom" is a new topic at Silicon Valley parties. P-Doom is the probability that an individual gives to AI bringing about catastrophe for humanity, and, as Casey Newton said in a recent episode of Hard Fork, "In the AI research community, there are people who think that probability is like 10 % or higher. " As fascinating a technological problem as AI is—and as much potential for good that it has—one must wonder why humanity is GETTING IN ALIGNMENT tinkering with a technology that experts believe has a 10% or higher chance of subjugating or eliminating our species. P-Doom may be something we don't have to worry about for a while. Even Sam Altman, CEO of OpenAI, the creator of it. It could be decades before AGI debuts. Or years. Or months. As Nick Bostrom points out, the experts are all over the map in predicting its arrival⁴⁰, but we had better solve the alignment problem long before its birth. The recursive self-improvement baked into AGI will likely cause a rapid intelligence explosion, leading from AGI to artificial superintelligence far faster than we would be able to react. You can imagine for yourself the risk that an unaligned vastly superior intellect would pose to the previous holders of the cognitive crown. This is an enormously difficult problem. Says OpenAI, "Unaligned AGI could pose substantial risks to humanity and solving the AGI alignment problems could be so difficult that it will require all of humanity to work together.⁴¹" That's sobering. OpenAI proposes to solve it by tasking AI with it: "Building and aligning a system that can make faster and better alignment research progress than humans can."⁴² What could possibly go wrong? ChatGPT, acknowledges that less is to be gained by training larger LLMs and more to be won by focusing on "rapidly increasing capability."³⁹ Or we may need different models, such as whole brain emulation, enhanced networks, or brain-computer interfaces, to achieve The promising solutions If this last section has been alarming, good. AI is here to stay, and AGI is coming. An uncontrolled experiment on an existential threat is folly, and even the inventors of the atomic bomb, working at the height of war, took every step they could to keep the world in one piece. We must do the same, policing our own use of AI, demanding that safety research progress even faster than the models do, advocating for robust regulation, providing the economic incentives for sensible AI development, and mitigating the negative effects on those disrupted by this technology. We must do all that not just for our safety but also for our direct benefit. AI could be a source of good unmatched in human history. It can design new drugs, monitor marine mammals, and map the progress society has made toward renewable energy. It's helping us detect deepfakes, communicate better across languages, and

optimize energy usage.⁴³ AI is behind a collaborative program linking NASA and the European Space Agency to gather and analyze crucial data about the earth and help GETTING IN ALIGNMENT the world meet the UN’s Sustainable Development Goals. AI solutions will be critical to commercializing nuclear fusion⁴⁴, improving global food security, and bring better health to more people for less money. The list goes on; imagine the problem, and you can be sure AI will have a role in solving it—up to and including the big ones like restoring the health of our planet. These are the applications Dickon Laws calls novelty, as you may recall. They are the places where visibility of the AI’s involvement recedes into the background. Is this a fantasy? Perhaps. It’s good to be skeptical, and it’s better to be vigilant. After all, nothing about AI is black and white. Nonetheless, “something quite profound is going on,” as Klein notes, and that’s with just the technology we have today. Properly aligned and with the political adjustments to match, AI could go a long way toward ending scarcity, and that’s about the most profound change imaginable. The AI natives If it isn’t obvious already, this should make it abundantly clear: All of us will have to work with AI in order to accomplish the tasks of daily life—the work of living and the toil of earning. For many of us, this will be a difficult adjustment, much like what those who did not grow up with computers had faced when those wonders came to the workplace and the home. Even digital natives will have to accustom themselves to the fact that their relationship with technology has shifted to something much more bilateral. That’s a fundamental change, one that treats technology as a partner, perhaps even an equal one. In a way, AI will become another member of the creative team that David Reichman spoke about and will help us create the narratives of our own lives. There is one group that will experience no adjustment: those born in the past few years, and those yet to be born. They will be AI natives, and, like Gen Z before them, they are the ones who will define how AI is integrated into culture. They will show us how humanity will adapt to this new, powerful force that it itself has unleashed. Hopefully, we will have given them AI aligned to their interests, their values, and their desires. Hopefully, it is a partner for them and not a master. Hopefully, it brings out another layer of potential in humans in much the same way agriculture, industrialization, and electronics—our previous paradigmshifting technologies—have. Hopefully, because of the unique partnership to be formed between AI, and those who grow up native to its wonders and its perils, those of us who pass before this world is born will have laid the groundwork for a better world for our children.

[150. LegalZoom Launches Doc Assist in Beta, Combining the Power of GenAI and Our Independent Attorney Network](#)

Press Release

LegalZoom Launches Doc Assist in Beta, Combining the Power of GenAI and Our Independent Attorney Network

Sep 28, 2023

[PDF Version](#)

Demystifying legal documents for free, with the opportunity to talk with an attorney if you require legal advice

GLENDALE, Calif., Sept. 28, 2023 (GLOBE NEWSWIRE) -- [LegalZoom](#), the No. 1 choice in online small business formations, today announced the beta launch of Doc Assist, a free document summarization product combining the power of generative AI and LegalZoom’s expertise in legal

tech to help small businesses quickly review documents, stay organized, grasp core details swiftly and effectively, and gain access to expertise from vetted attorneys to make more informed decisions.

Doc Assist is a simple concept. Upload any legal document, and Doc Assist immediately provides the core details, distills crucial clauses, and prompts insightful questions tailored for that document type. Doc Assist combines cutting-edge Generative AI with our unique understanding of legal documents and their structures. Think of it as a tailor-made map for navigating the intricate world of legal paperwork.

Small businesses are afraid of attorneys. They think they're expensive and use confusing and intimidating jargon. They don't have a lot of time to find the right one, and when they do, they worry about spending too much time with them due to costs. This means many small businesses simply avoid attorneys and end up taking unnecessary risks – they sign leases, keep incomplete employee files, and often trust contracts from bigger, more established companies. The internet is awash in legal documents and many businesses adopt them as their own, without understanding what they are signing or sending for signature. 85% of current LegalZoom customers haven't spoken to an attorney. And it's estimated that [40-60%](#) of the population leaves its legal needs unmet. The numbers get worse when considering underserved communities. The problem is clear.

“Every small business should be able to understand the contracts it signs or sends for signature. Generative AI is an important component, but it's best coupled with a credentialed attorney who is well versed in the type of legal document in question. LegalZoom is in a unique position to provide access to both,” said Dan Wernikoff, LegalZoom's CEO.

To try the beta version of Doc Assist and learn more about LegalZoom offerings, please visit legalzoom.ai.

About LegalZoom.com, Inc.:
LegalZoom is the leading online platform for business formation in the United States. Driven by a mission to unleash entrepreneurship, LegalZoom delivers comprehensive legal, tax and compliance products and expertise for small business owners through easy-to-use technology. From free business formations to business management solutions and professional advisory services, LegalZoom supports millions of small business owners and their families throughout the entrepreneurial journey. Founded on the belief that everyone should have affordable access to legal and financial expertise, LegalZoom empowers entrepreneurs to make their dream a reality. To learn more about LegalZoom, visit www.legalzoom.com.

Forward-Looking Statements:
This press release contains forward-looking statements. LegalZoom intends such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. All statements other than statements of historical facts contained in this press release may be forward-looking statements. In some cases, you can identify forward-looking statements by terms such as “may,” “will,” “should,” “expects,” “plans,” “anticipates,” “could,” “intends,” “targets,” “projects,” “contemplates,” “believes,” “estimates,” “forecasts,” “predicts,” “potential” or “continue” or the negative of these terms or other similar expressions. Forward-looking statements are subject to a number of risks and uncertainties, many of which involve factors or circumstances that are beyond LegalZoom's control. Actual results could differ materially from

those stated or implied in forward-looking statements due to a number of factors, including but not limited to, risks detailed in “Risk Factors” section and elsewhere in LegalZoom’s Quarterly Report on Form 10-Q for the quarter ended June 30, 2023, filed with the SEC on August 8, 2023, as well as those in its subsequent filings with the SEC. These forward-looking statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements. LegalZoom qualifies all of its forward-looking statements by these cautionary statements. Except as required by applicable law, LegalZoom does not plan to publicly update or revise any forward-looking statements contained in this press release, whether as a result of any new information, future events or otherwise.

151. [AI principles](#)

Data and AI ethics principles

Thomson Reuters will adopt the following Data and AI Ethics Principles to promote trustworthiness in our continuous design, development, and deployment of artificial intelligence (“AI”) and our use of data:

That Thomson Reuters use of data and AI are informed by our [Trust Principles](#).

That Thomson Reuters will strive to partner with individuals and organizations who share similar ethical approaches to our own regarding the use of data, content, and AI.

That Thomson Reuters will prioritize security and privacy in our use of data and throughout the design, development and deployment of our data and AI products and services.

That Thomson Reuters will strive to maintain meaningful human involvement, and design, develop and deploy AI products and services and use data in a manner that treats people fairly.

That Thomson Reuters aims to use data and to design, develop and deploy AI products and services that are reliable, consistent and empower socially responsible decisions.

That Thomson Reuters will implement and maintain appropriate accountability measures for our use of data and our AI products and services.

That Thomson Reuters will implement practices intended to make the use of data and AI in our products and services understandable.

Thomson Reuters will use employee data to ensure a safe and inclusive work environment and to ensure employee compliance with regulations and company policies.

We believe these Data and AI Ethics Principles will provide our colleagues and partners with the right foundations to build trustworthy, practical, and beneficial AI for our customers. These Data and AI Ethics Principles will evolve as the related industries continue to mature.

152. [Comprehensive impact of AI](#)

The Impact of Artificial Intelligence on Legal Practices

The intersection of technology and law brings forth a myriad of opportunities and challenges that demand our attention. From simplifying labor-intensive tasks to revolutionizing legal research methodologies, AI is fundamentally altering the way legal professionals operate. As we start using it more widely, it becomes imperative to dissect the various facets of its impact, ranging from enhanced efficiency in document analysis to the ethical considerations surrounding autonomous decision-making algorithms. Here we will discuss the profound implications of this innovation on legal proceedings.

We aim to explore the potential advantages and ethical dilemmas emerging as machines become a huge part of jurisprudence. Through an analysis of real-world implementations and foreseeable obstacles, our goal is to provide readers with a thorough comprehension of how AI is fundamentally transforming legal practices.

Legal Research and Document Review

Legal research and document review have long been integral aspects of legal practice, demanding considerable time and resources. AI technologies, such as machine learning and natural language processing, are changing how specialists conduct analysis and examine vast amounts of documents. Let's take a look at some of the advantages this development brought to these procedures.

Efficiency and Speed. It can analyze and sift through massive volumes of legal data in a fraction of the time it would take a human researcher. This acceleration enables workers to access relevant information swiftly, allowing them to focus on higher-value tasks.

Accuracy and Precision. Natural language processing algorithms possess the capability to comprehend context, extract pivotal concepts, and identify precedents with a remarkable level of precision. This not only diminishes the probability of errors but also elevates the quality of legal analysis.

Predictive Analytics. By examining historical case outcomes and legal precedents, AI can assist lawyers in making data-driven predictions about the potential success or challenges of a case.

Cost-Effective Solutions. Automating routine research tasks allows specialists to allocate their time more efficiently, reducing the overall hours spent on research. This, in turn, can result in increased productivity and cost-effectiveness.

Due Diligence in Transactions. These tools can analyze contracts, identify key clauses, and highlight potential risks or compliance issues. This not only expedites the due diligence process but also ensures a more thorough and comprehensive review.

Contract Review and Management

Dealing with any contracts requires meticulous attention to detail and a comprehensive understanding of legal language. AI technologies have become powerful instruments for automating and improving the process. These algorithms allow us to comprehend and analyze contracts, extracting key information and identifying critical clauses faster. This acceleration gives an opportunity to expedite the review process, enabling workers to handle larger volumes of contracts.

Those innovations bring a level of precision to contract assessment that is challenging to achieve through manual processes alone. They can identify inconsistencies, flag possible threats, and confirm that agreements comply with legal standards.

Moreover, AI facilitates the automation of abstraction and summarization. Legal practitioners can use these tools to extract fundamental data points and generate concise summaries of complex contracts. This feature is particularly valuable in scenarios where a quick overview of terms and obligations is needed.

Also, it contributes to the entire contract lifecycle management process by automating routine tasks associated with creation, negotiation, and renewal. [Automated workflows](#) and reminders help ensure that critical dates and obligations are not overlooked.

Predictive Analytics for Case Outcomes

Predictive analytics empowers specialists to make data-driven decisions by analyzing patterns and trends in historical data. By considering factors such as case type, jurisdiction, judge, and relevant precedents, lawyers can gain insights into the possible outcomes of a case. This approach improves decision-making, allowing legal practitioners to develop more informed and strategic tactics. What are some other benefits?

Risk Assessment and Mitigation. By identifying patterns associated with successful or unsuccessful outcomes in similar cases, lawyers can gauge the potential risks and challenges a case may present. This allows for proactive risk mitigation strategies and better-informed client counseling regarding the probable results of legal proceedings.

Resource Optimization. By focusing efforts on cases with a higher likelihood of success or by identifying pivotal factors influencing case outcomes, lawyers can optimize their time, energy, and resources. This leads to boosted efficiency in managing caseloads and enhances overall productivity.

Case Preparation. Understanding the likely trajectory of a case allows experts to tailor their strategies, arguments, and evidence presentation accordingly. This strategic approach improves the general preparedness of legal teams and raises the likelihood of achieving favorable results.

Client Counseling. Lawyers can use data-driven insights to communicate potential results realistically, helping clients understand the risks and uncertainties associated with their legal matters. This transparency fosters trust between specialists and their clients.

Automation of Routine Tasks

The legal industry is traditionally characterized by meticulous and time-consuming tasks. The incorporation of Artificial Intelligence is transforming this niche through the automation of routine processes. Mundane and repetitive tasks, such as document drafting, data entry, and administrative

processes, can be automated, freeing up valuable time for workers to concentrate on more complex and strategic aspects of their jobs.

These tools enable the creation of document templates and the automatic generation of documents. This includes contracts, agreements, and other routine paperwork. You can input key variables, and the automation system generates customized records, reducing the time spent on manual drafting.

“alt”=“task automation”

Also, it facilitates data entry processes by extracting, categorizing, and organizing information from various sources. This is particularly beneficial for research, case management, and maintaining accurate client records. These instruments can analyze vast databases of information, extract relevant case law, and provide summaries.

With this development, routine workflows, such as approval processes, document reviews, and task assignments, can be automated to follow predefined sequences. Workflow mechanization guarantees that tasks are completed in a systematic and timely manner, lowering the chance of bottlenecks. Additionally, businesses exploring innovative payment solutions, like the option to “[buy USDT](#)“, can seamlessly integrate such transactions into their automated workflows, ensuring efficiency and flexibility in financial operations.

Improved Due Diligence Processes

Due diligence processes, critical in various lawful contexts such as mergers and acquisitions, are undergoing a transformative evolution as well. AI algorithms can analyze financial records, contracts, and regulatory compliance documents, with speed and accuracy that surpass conventional manual methods. They can extract fundamental clauses, obligations, and deadlines, providing a detailed overview of contractual obligations. This streamlines the identification of potential issues and contributes to a more thorough due diligence assessment.

This development enables the visualization of complex data sets, offering intuitive means for decision support. It allows for a more comprehensive understanding of the relationships and patterns within the due diligence data. Also, it gives an opportunity to customize and tailor these processes to the specific needs of each transaction. This flexibility ensures that the efforts are focused on the most relevant aspects of the deal, optimizing the use of resources.

Automated procedures can cross-reference information across multiple sources, ensuring accuracy and verification. This capability is crucial in identifying discrepancies or inconsistencies in the information provided.

However, many users often wonder how to do [app development](#) qualitatively. For this, you don’t need to spend a long time looking for good and trusted developers. You can simply turn to artificial intelligence, but it is important to ask the right question.

Challenges and Considerations

The adoption of automation technologies in legal practices brings about numerous advantages, but it is paramount to navigate the associated challenges. Specialists must approach it strategically. Below we gathered some of the issues you might encounter and the solutions you can apply.

Data Security and Privacy Concerns

Challenge: The handling of sensitive and confidential information raises concerns about data security and privacy.

Solution: Implement robust security measures, encryption protocols, and compliance with data protection regulations to safeguard client information.

Ethical Use of Automation

Challenge: Ensuring the ethical use of automation instruments, including transparency, accountability, and avoiding biases in algorithms.

Solution: Prioritize ethical considerations in the development and deployment of these technologies, adhering to professional standards and guidelines.

Adaptation and Training

Challenge: The successful integration of this innovation requires workers to adapt to new tools and workflows. To address the challenges of adapting to new technologies, organizations can leverage [ai development](#) services and expertise to streamline the integration of AI-powered solutions into their legal workflows and processes.

Solution: Invest in comprehensive training programs to ensure that legal teams can properly leverage all the tools, maximizing their benefits while minimizing the risk of errors.

Human Oversight

Challenge: Human oversight remains necessary, especially in interpreting nuanced legal issues and making strategic decisions.

Solution: Strike a balance between automation and human expertise, providing that all decisions incorporate legal judgment and ethical considerations.

Interoperability and Integration

Challenge: Integrating these implementations with existing systems and workflows can be challenging, leading to issues of interoperability.

Solution: Assess the compatibility of automation tools with their existing infrastructure and invest in solutions that easily integrate into their workflow.

Costs and Return on Investment

Challenge: Implementing these technologies may entail initial costs for software, training, and infrastructure upgrades.

Solution: Conduct a thorough cost-benefit analysis to determine the potential return on investment, considering both short-term and long-term gains.

User Acceptance

Challenge: Resistance to change and user acceptance may pose difficulties during the adoption of new developments.

Solution: Involve key stakeholders in the decision-making process, communicate the benefits of automation, and provide adequate support and training to enhance user acceptance.

Scalability

Challenge: Scalability issues may arise when expanding the initiatives to handle increased workloads.

Solution: Choose resolutions that are scalable and can adapt to the growing needs of the practice.

Bias and Fairness

Challenge: Ensuring fairness and avoiding biases in algorithms, particularly in AI applications, is a significant concern.

Solution: Assess and manage biases by promoting fairness and equity in decision-making processes.

Conclusion

The integration of Artificial Intelligence into legal practices represents a transformative shift that has far-reaching implications for this industry. The multifaceted impact of this innovation on legal research, document review, contract management, predictive analytics, automation of routine tasks, and due diligence processes underscores the profound changes. It is definitely reshaping the way legal professionals work. While offering unprecedented efficiencies, accuracy, and strategic insights, the adoption of AI also brings forth challenges.

They are related to ethics, data privacy, and the need for ongoing adaptation. A balanced and responsible approach to harnessing the potential of this technology will be paramount in ensuring the continued advancement and ethical practice within the legal field.

153. [Legal Technology & Alternative Legal Services Guideline](#)

Legal Technology & Alternative Legal Services

cam is the first Indian law firm to adopt Artificial Intelligence (AI) and Machine Learning (ML) based Legaltech in its day-to-day practice. The firm's focus on driving innovation has resulted in the utilization of various AI and ML tools for tasks such as due diligence, contract review and abstraction, evidence management, litigation strategy, legal research, and intellectual property. These tools leverage the firms existing practices and add value for our clients and practice groups. The use of Legaltech at the firm is not limited to one practice area or one technology. We focus on identifying challenges and exploring relevant solutions to increase efficiencies across practice areas.

Automated Proofreading and Editing

An integral part of a lawyer's work is proofreading and editing drafts and documents. cam is committed to providing quality documents with the highest level of accuracy to its clients. The use of proofreading tools helps in:

Removing inconsistencies in usages and styles across a document;

Reducing time spent on manual search for errors;

Increasing efficiencies and accuracy, allowing Associates to focus on more high-value tasks.

Contract & Due Diligence Review

To support our practice groups with the due diligence process, we use an AI-based contract review tool. The tool helps our lawyers identify and quantify key risks, obligations, and deal breakers. We have seen an average of 20% to 30% increase in efficiency using this software. We have identified various use cases for the tool at the firm, including Lease Review, Force Majeure Audits, Insurance Reviews, Contract Comparisons, Obligation and Change Management reviews. The General Corporate and Capital Markets practices benefit the most from this tool.

Client Focus: Through the use of this technology, we are able to gain actionable insights into deal points and advise our clients on future trends and risks.

Document Automation

Document automation uses technology to standardize document drafting. We currently use document automation as part of our internal quality assurance processes to standardize agreements.

Since automation maintains quality, consistency, timeliness, and cost efficiency while drafting various standard and complex documents, our lawyers are able to focus on complexities along with contract negotiations and overall strategy.

Client Focus: Through various projects, cam advises established clients as well as new businesses and startups towards standardizing their key documents and provides ongoing assistance in streamlining the document assembly process.

eDiscovery & Litigation Services

To complement the services of our Disputes team, we leverage eDiscovery technologies to effectively process and analyze high volumes of documents or e-files. We work with a range of eDiscovery platforms depending on the nature of each case. Our services offer end-to-end case and evidence management, including hosting, processing, and high-speed analysis of large data sets, using Technology Assisted Review or Predictive Coding. The team uses eDiscovery technologies to work on White Collar Crime Investigations, Government requests, Investigations, and Litigations including class action suits, Discovery Requests, etc.

These tools support the Disputes team by providing them the ability to:

Review matters end-to end;

Maintain Attorney – Client Privilege;

Identify and flag urgent information, even while the review is underway.

Legal Research & Litigation Strategy

By nature and training, most lawyers are thinkers and questioners. Over the years, we have used books and websites to research and analyze all possible angles of our arguments. Research methods have evolved and enhanced the capabilities of our Associates, through the adoption of various AI-based research tools to perform primary and secondary legal research.

These tools further enrich the firm's service offering to clients, which are as follows:

Providing more accurate and relevant search results at optimum speed;

Increasing time efficiencies and saving cost by using the best technology to assist Associates to analyze their research.

Ability to quickly and granularly map case law and assess relevance;

Centralized management of case-related tasks and reminders;

Improved efficiencies by providing more sophisticated and accurate search results, which are not merely based on keywords;

Reduction in hours spent on understanding the relevance of a case law to the matter;

Early identification of possible counter arguments, informing case strategy from the initial stages of a dispute.

154. [AI workplace use policu](#)

What is an AI Workplace Use Policy?

An AI Workplace Use Policy is a set of guidelines and rules established by a company to govern the appropriate and responsible use of artificial intelligence (AI) technologies in the workplace. With the burgeoning use of generative AI in both work and personal settings, having an AI policy in place that defines the risks and appropriate uses of the technology for work purposes can help to mitigate potential risks to the company itself.

AI Workplace Use Policies outline the expectations, rights, and responsibilities of both employees and the company regarding the use of AI tools and systems. The policy covers permitted uses of AI, requesting permission, both the employee's and company's obligations, intellectual property issues, data privacy and protection, and protection of confidential information.

When to use an AI Workplace Use Policy:

You're an employer who wants to ensure employees follow established guidelines for proper use of artificial intelligence in the workplace and understand the risks to the business of using the technology in a reckless manner.

You're a business owner who wants to implement AI policies in your company to assure clients that you are taking seriously the risks associated with AI use.

Workplace AI Use Policy checklist

Complete your free Workplace AI Use Policy with our Make it Legal™ checklist

Make this document

Customize your Workplace AI Use Policy by answering simple questions. We'll help you along the way and build a document that fits your needs. Plus, you can always save and continue later once you've started your document creation process. [Get started now!](#)

Review your policy

Look over the Workplace AI Use Policy to ensure it matches your intentions. If you need to make changes to the Policy outside of the interview, you will be able to make changes online or in Word format in the Document Manager at the end of the process.

Remember that if you have any questions you can easily [Ask a Lawyer](#).

Distribute

Provide a copy to each employee. Add the Workplace AI Use Policy as an attachment to your Employee Handbook for future reference and for all new employees.

Keep a copy of all documents for your own records and in case there is a problem.

You can use Rocket Lawyer to store your Workplace AI Use Policy. Safe and secure in your Rocket Lawyer account, you can access it anytime from any computer, as well as share it for future reference.

Purpose of the AI Policy (“Company”) is excited by opportunities for innovation and efficiency offered by artificial intelligence (AI) models and tools. We intend to incorporate AI into our Company’s operations in a safe, ethical, and legally compliant manner. We aim to enable our Company, employees, and other stakeholders (e.g., our clients) to obtain maximum benefits from new and established AI technologies.

The Company has implemented this AI Workplace Use Policy to help us to achieve the above

Reasons to Update

To add, change or remove which AI tools and use cases are permitted.

To add, change or remove which user groups may use the tools.

To add, change or remove who will be responsible to review and approve AI integrations.

To provide additional rules for use of AI or clarify information previously provided.

155. Artificial Intelligence Use Case at A&O

In February 2023 our team became the first in the world to implement generative AI across an international law firm at enterprise level.

Thousands of our lawyers in 43 jurisdictions now use GPT-4-based tools in their day-to-day work.

Pioneers in the use of generative AI

Our client advice is grounded in the extensive and rigorous program we undertook to safely and responsibly integrate this technology – Harvey – in our own business.

And we don't just use AI-based tools, we build them, too. Our proprietary contract drafting tool, [ContractMatrix](#) – developed in partnership with Microsoft and Harvey – streamlines contract drafting, review and analysis.

ContractMatrix has been tested and refined by more than 1,000 of our lawyers and, following its launch at the end of 2023, is now being licenced to clients.

We understand all forms of AI and the specific issues each raises from a risk management, contract and licencing perspective.

Our experience spans everything from helping nation states shape their AI policies to advising businesses across industries on how to develop effective and responsible AI solutions, handle AI-focused transactions (including M&A, JVs and collaboration deals), construct AI collaboration agreements and manage AI-related disputes.

[They are] miles ahead of any other firm on AI.

Representative matters

A syndicate of global organisations on the safe deployment of generative AI. Our work included developing a toolkit for assessing and mitigating key legal risks (across U.S., U.K. and EU laws) and implementing an enterprise change management programme to support the deployment of generative AI.

A life sciences company on the design and drafting of a governance framework to triage AI use cases across its global functions and businesses, as well as building the software application to encode that framework .

Sole legal counsel to Partnership on AI; advised on its draft generative AI safety protocols and a collaboration arrangement relating to the roll-out of certain of its data ethics guidelines.

A provider of metaverse solutions on compliance with data protection law and the new digital EU regulations.

A global IT services provider on a global compliance programme for the use of generative AI.

A private equity fund on the strategic issues arising from the development of generative AI models.

Leading AI drug discovery company Exscientia on its c. USD700 million collaboration agreement with Merck for the deployment of Exscientia's AI platform.

A government on its roadmap for adoption of AI across various g

HARVEY

Our deployment of Harvey, an OpenAI-backed tool based on GPT-4, began with a sandbox. In other words, we gave access to a limited number of lawyers in a ring-fenced environment. Sandboxes are crucial for any business looking to deploy generative AI because it's hard to predict what the technology will do until you use it. We tested, adapted, and moved ahead – all in a safe and secure environment. We only rolled out Harvey to a wider group once we could mitigate its risks, and we continue to gather and act on feedback we receive.

We also established an AI steering committee and an AI brains trust to help our experts understand AI's current and future capabilities and how it can be harnessed across every area of our business. Alongside this, all our existing governance structures, including our risk committee, now consider generative AI in their day-to-day decisions.

Clear governance and guardrails are critical to successfully deploying AI. We have specific rules of use in place and train our people how to use AI tools effectively and safely.

People are the common thread that runs through all our work with AI. We know that generative AI is an augmentative tool. Everything Harvey produces is rigorously checked, edited and finessed by our team. It enhances the work our lawyers do and helps us produce better results for our clients. In turn, it is governed and augmented by the gold-standard critical thinking and creativity for which A&O Shearman lawyers are known.

OUR AI GROUP

Our multidisciplinary AI Group advises clients on the responsible development, deployment and use of AI.

We combine a sophisticated understanding and experience of technology with deep expertise in intellectual property, data privacy, regulation, technology transactions, litigation and change management.

We help our clients to manage the risks associated with this powerful technology which fall under two broad categories.

First, AI models make errors. Crucially, even those who build and train the models can't explain and account for them. This so-called "black box" problem creates significant risks.

Hallucinations: These are incorrect outputs that could lead to, for example, tort liabilities, consumer harm or regulatory breaches. Hallucinations can be the result of incorrect or out-of-date data, inaccurate mathematical predictions based on weighting of sources or randomization, or historical bias in the datasets used to train the models.

Unpredictability: A lack of explainability also creates a lack of predictability: you can't be certain exactly what the model will say in response to a question. This can make it extremely difficult to check that it meets standards of quality and accountability.

Response divergence: By their very nature, AI models will give multiple answers to the same question. This could be evidentially relevant if, for example, an AI chatbot built to give financial advice delivers different responses to two individuals leading to divergent outcomes.

Second, generative AI models take human content and account for it in a mathematic response. A user may therefore be working with someone else's information without permission, credit, knowledge, or even awareness. This raises significant IP infringement questions: for example, can the user assert ownership over the model's output? And is their own IP safe if they are using the model?

There are also consequential questions about data privacy and data protection, for example, where an AI model has been trained using personal data or a user inputs personal data as a prompt.

Our AI Group provides answers to these substantive legal questions on a syndicated basis. You can sign up to join a series of one-hour calls with other businesses, each in a controlled environment monitored by an antitrust lawyer. The calls deal with specific issues and are supplemented by minutes and additional written materials such as formal memos, policy guidelines, or comparative analyses.

So far, we have covered topics including a primer on AI, ChatGPT policy, IP infringement and data risks, licensing a large language model (LLM) and change management, and have welcomed attendees from industries including financial services, pharma, technology and telecoms.

For more information, please get in touch with your usual A&O Shearman contact.

CONTRACTMATRIX

At A&O, we don't just use AI-based tools: we build them.

[ContractMatrix](#) streamlines contract drafting, review and analysis using:

Generative AI-assisted interrogation and drafting

Real-time access to your gold-standard precedents and policies

Inbuilt risk management and governance designed by A&O Shearman lawyers

It has been developed in partnership with Microsoft and Harvey, which builds custom LLMs for lawyers. ContractMatrix has been tested and perfected by more than 1,000 of our lawyers and, following launch at the end of 2023 with [Financial Times coverage](#), is now being licenced to clients.

156. [Good practices using AI](#)

Artificial Intelligence (AI) is already a reality whose uses and benefits are apparent both for individuals and organizations. It is present in our daily lives and in our vocabulary and its countless utilities and applications become incrementally clearer. The use of chatbots, which help users with questions related to products and services, and virtual assistants, which perform tasks in response to commands and offer several types of assistance, are examples of the use of technology that benefit both the companies and the users. According to a 2021 survey conducted by IBM¹, one third of the information technology (IT) professionals surveyed stated that their companies already use AI. The data also indicate that 74% of the companies are exploring or using the technology and that they have accelerated the implementation process due to the COVID-19 pandemic. Despite this, the topic is not always discussed based on a clear concept of what AI really is, and

ethical-legal aspects already consolidated in the local and international scenarios are also not considered in their entirety. There are ethical principles that underlie the use of this technology, which must be observed from the moment of creation to its practical application. That is the case, for example, of the principle of nonmaleficence, which, in general terms, establishes that Artificial Intelligence should be used without causing foreseeable and intentional damage, as well as establishing that risks should be mapped and, as far as possible, avoided. It is not uncommon that the debate on AI and even its application is not accompanied by a clear conceptualization, which is important to defining the applicable ethical-legal system, differentiating it from other technologies.. In general terms, we can say that Artificial Intelligence consists of algorithms trained by data to perform certain tasks autonomously – tasks that, until then, could only be performed by human beings. Hence, human intelligence and Artificial Intelligence are complementary. After the programming of the machine, however, AI is often able to independently perform tasks such as analyzing databases, identifying patterns and recognizing faces and objects. On the one hand, AI is, as many people presume it to be, complex. Choosing mathematical I models and architectures of well-known artificial neural networks requires specialized technical knowledge. On the other hand, however, it is extremely practical, intelligible and applicable. Once created, its use can be simple. Thus, this technology is very useful and provides countless advantages to the companies, such as reducing production time and costs, bringing clients closer and increasing productivity, aspects that, when combined, generate high economic impacts. In recent decades, we have witnessed an intense digital transformation, which has grown even further in recent years with the use of algorithms and their derivations. This has led several organizations and companies to dedicate themselves to business transformation by integrating new technologies into their operations. This commercial and digital transformation has also been positive for attracting new consumers, who seek services and products adapted to the new reality. The levels of demand, publicity and public scrutiny to which companies are subject require processes that respect ethical tenets and legal rules. A company with processes adapted to local and international standards for the use of Artificial Intelligence also tends to attract more qualified professionals, creating a circle of generation of benefits for all parties involved. Companies improve their processes, products and services by applying technology in an ethically responsible manner; consumers have access to better quality products and services; professionals work in establishments that respect the existing rules in order to provide better services and seek companies that are in accordance with their level of qualification; finally, in this cycle, companies attract more consumers, increase sales figures and arouse the interest for collaboration from even more qualified professionals. In addition, there is also the possibility of establishing commercial partnerships, whether at the local or international level, with companies equally adapted to new technologies and concerned with ethical-legal issues related to their use. In this regard, McKinsey Global Institute emphasizes that AI has great potential to contribute to economic activity around the world. It is estimated that by 2030 the technology will add 13 trillion dollars to economic production, with a 1.2% increase of the annual global GDP². Despite all of these potential benefits, integrating Artificial Intelligence into a company's routine is not a trivial task and cannot be done in a careless or hasty manner. While the introduction of AI can bring major advantages, its careless use carries high risks. In other words, what is a great opportunity for growth can also be a threat and generate conflicts from the perspective of civil liability. This leads us, once again, to the need for knowledge and practical observance of the ethical-legal standards that govern Artificial Intelligence in all processes and stages of application in a company. In general, it is necessary to take a preventive stance, attentive to possible risks and adopting measures to avoid them before

they manifest. Accordingly, the ethical and responsible use of AI will ward off the main risks of its use and reinforce its potential. As happened with the Brazilian General Data Protection Law (LGPD - Law no. 13,079/2018), which resulted in the mobilization of companies to adapt to the legal requirements related to the protection of personal data, Artificial Intelligence will soon be on the agenda of several organizations, which will seek its integration into their processes and adaptation to the legal regulations. Hence, companies that take notice of the technology's growing momentum, which is already apparent to the more attentive observer, will be able to define, in advance, measures to understand the ethical-legal contours and parameters of the technology and the ways in which it can be incorporated into their business. In a short time, these measures will constitute the grounds for a great competitive differential. Within this context, the purpose of this Guide is to provide a comprehensive introduction to Artificial Intelligence, addressing its concept, the principles and rules involved and the consequences of its use. The approach used here is aimed at the practical application of the technology, focusing on serving as an aid for companies that are willing to implement it in their products. Thus, we seek to provide guidelines for the ethical and responsible use of AI, intensifying its potential applications and ensuring compliance with mandatory measures. To achieve this purpose, we begin this Guide with a detailed explanation of Artificial Intelligence. In chapter 1, we address the concept of technology, its characteristics and modalities. Next, we present and explain the principles that must be observed for an ethical, responsible and reliable use of AI. Item 3 deals with AI compliance, commenting on the main local and international rules that dictate the use of the technology. Complementing this topic, in item 4 we discuss the relationship between Artificial Intelligence and data protection, which gives rise to the application of specific rules, including requirements of cybersecurity, and on the relationship between AI and Intellectual Property (IP). Following this, there are some recommendations and best practices to be followed by companies that already use or want to use AI in their processes. These encompass concrete measures that are intended to meet legal and ethical requirements and which reinforce the logic of risk mitigation. In item 6, we briefly present some success cases in the use of the technology that indicate its potential. This content is followed by a list of steps to be followed by companies: a brief summary focused on the practical and actionable steps that can be carried out by organizations. To conclude this Guide, we indicate some glossaries for consulting common concepts and expressions in the field of AI, in addition to the references used, which can also be consulted for further in-depth study. Although it is possible to indicate more remote origins and significant groundwork related to Artificial Intelligence, it was mainly since the 1950s that the concept began to assume a format closer to how we conceive it today. There are two fundamental milestones that paved the way for the concept: the Turing Test and the conceptualization of John McCarthy. Alan Turing, in an article published in 1950³, described his experiment which became known as the Turing Test or the imitation game. In general terms, it refers to running some tests in which a human being and a computer should provide answers, and, in the sequence, another human being would analyze them and attempt to distinguish which were given by the machine. If the distinction is not possible, the machine is said to have passed the test. The test was enthusiastically received by the scientific community, which began to explore the idea and experiments even further. A few years later, in 1956, a seminar lasting about two months was held at Dartmouth College in New Hampshire, in the United States, where scientists, who would become the most instrumental for AI, met to discuss various issues that were on the agenda at the time, such as the limits and possibilities of machines' capacity and their potential to perform tasks until then performed only by humans⁴. The pioneering use of the expression Artificial Intelligence was made during this seminar by John McCarthy. Following these contributions, the topic became

more present on the agenda of scientists, and debates, experiments and events were dedicated to testing and developing the capacity of machines until we reached the current state of evolution⁵. Even with countless studies and discussions, there is still no universal concept of Artificial Intelligence. However, it is possible to deduce the common idea between the different concepts, which allows us to clearly understand what we are talking about, when referring to AI. In general terms, Artificial Intelligence is the term used to designate systems that have the capacity to learn and perform tasks previously only performed by humans. As a rule, this execution is preceded by the development and training of algorithms⁶ carried out by a person, but there are already artificial intelligence systems that have the capacity to learn on their own as they carry out their activities. Models and algorithms have improved exponentially and performed increasingly complex tasks. There is an important AI feature that contributes to this development: the technology is based on the use of data – in general, a large volume of data, known as big data. These data feed the Artificial Intelligence, allowing for more accurate and informed decision-making. It is based on such data that different AI functions are performed, such as sorting data, generating forecasts, identifying and sorting images, making decisions, and many others⁷. These are things that, until the advent of AI, only humans have been able to perform. Similarly, Luciano Floridi and Josh Cowls present a concept of AI that, despite having debatable aspects, allows a clear understanding of the theme and documents referring to technology. The concepts of Nils Nilsson and Nick Bostrom also help with the more comprehensive understanding of what exactly is being referred to when talking about AI: Due to the fast-paced technical evolution that AI is providing and will provide in the near future, it has even been said that its potential will surpass human intelligence. However, as we have already mentioned, there is an understanding that it is unfeasible to talk of replacing one intelligence with another. It is, in fact, a relationship of connection and complementarity. By performing even simple tasks, AI is already contributing to allow the human brain to focus on more difficult and complex issues that machines cannot yet perform, and even to develop machines with ever-greater capabilities. Thus, Artificial Intelligence will even enhance human capabilities and perform tasks that the human brain alone cannot – or that can carry out at a much lower speed. This may seem difficult to grasp, but we can think, for example, of a comparison between the human memory capacity, which is limited and tends to degrade over time, in relation to the storage capacity of a computer, whose data, if treated properly, will not degrade and storage is virtually unlimited. Similarly, AI is capable of processing a greater amount of information at an even greater speed. However, it is worth emphasizing once again that these feats are only possible, at least currently, as a result of human collaboration, which reinforces their complementary nature. Today, AI shows a great deal of potential in specific applications that are already widely used in our daily lives. This Artificial Intelligence that we currently use is referred to as Weak or Narrow AI, due to its limited ability to perform functions other than those for which it was trained. There is, however, an expectation regarding what has been categorized as Strong or General AI, but we still do not know how or when this will become a reality. “Weak Artificial Intelligence (Weak AI or Narrow AI) is a specific intelligence, focused on an activity or area and that performs only that for which it was taught. It is the classic example of the system programmed to play chess, which plays only chess, but does it with excellence. It is the most used form today and is more present in our daily lives. The fact that it is called weak, however, does not diminish its unprecedented utility to perform complex tasks, and to learn from the data and contexts it is given. This is the case, for example, of recommendation algorithms, chatbots and even autonomous cars. In turn, Strong Artificial Intelligence or General Artificial Intelligence¹¹ is not limited to a specific issue, given that it possesses a more general and comprehensive intelligence, adapting to different contexts and

situations. Due to its complexity, it has yet to be developed and will require greater attention due to the risks it can generate. Below, we present an outline of the main learning techniques involved in training Artificial Intelligence algorithms, in order to understand how Machine Learning works.

Machine Learning With this method, the algorithm is trained with a large amount of data in order to answer questions and solve problems. Among the most used algorithms in machine learning are “decision trees”, “K-means” and “deep learning” to solve tasks that can vary between “supervised learning”, “unsupervised learning” and “learning by reinforcement”. What makes Deep Learning attractive is its ability to solve all three tasks, as explained below.

Supervised learning The most utilized technique today. It uses data labeled by humans for training and for testing the results to verify that the algorithm generates responses with the expected accuracy. With this technique it is possible, for example, to make forecasts, such as sales in a given scenario; analyze probabilities; sort images and other data.

1. **Unsupervised Learning** Uses unlabeled data to explore possible results, seeking information that, a priori, is not known. Through, for example, grouping (according to client profile, behavior, etc.) and data associations, it generates useful results for the company, such as identifying patterns and problems.
2. **Learning by reinforcement** Uses positive and negative reinforcements and uses its own mistakes and successes throughout the process to learn how to make a decision/choose the best path to follow. It can be used, for example, to recommend content and advertising: depending on whether a client consumes the recommended content and the products indicated, the algorithm learns more about the client’s preferences.
3. **Deep Learning**¹² This is a more sophisticated form of machine learning, which learns and performs more complex tasks. Based on neural networks, which are inspired by the functioning of the human brain, they use a large number of artificial neurons connected in multiple layers, hence the reference to their “deep” nature. Its configuration can be carried out mainly through 3 different machine learning tasks:
 - Natural Language Processing (NLP)**: the area that is dedicated to linguistic processing, recognizing meanings in texts and speech, allowing communication with humans. This technique is widely used in Chatbots, translators and virtual assistants like Siri, Alexa, Google Home.
 - Robotic process automation (RPA)**: as the name suggests, it refers to the automation of certain tasks and processes, which can involve different files and even systems. For example: filling in documents, reports and spreadsheet data; copying data between and among forms; detecting payment for subsequent issuance of invoice, followed by shipment of the product; and organizing registrations. It is useful for mechanical processes, which traditionally are done manually and in which there is practically no variation. It is an attractive alternative for starting the application of AI in a company, as it does not require major structural changes or an extremely advanced IT infrastructure.
 - Chatbots**: the algorithms are programmed to, from their database, allow the machine to interact and converse with humans, either through voice or text. It is one of the easiest applications to understand and it can be used for customer service, FAQ and even to schedule services. It can be used in combination with other AI techniques, enhancing its effect. Along with NLP, for example, the chatbot becomes able to understand more clearly what the user means. With machine learning, the chatbot learns from conversations, improving its responses.

Recommendation algorithm: an algorithm that makes recommendations for content, products and services based on users’ profiles. The algorithm needs to be fed with data, which will be categorized to identify patterns with cutouts, for example, of gender, age and social class. Based on this, it will analyze, depending on the case, consumption habits, consumed content and the like to make new recommendations. To keep up to date, the algorithm requires considerable data storage and processing capacity. This is what we see, for example, in movie, series and music streaming apps, as well as social networks recommending new content and stores that potentially

will be of interest to the user. The use of this algorithm by a company allows a more precise reach of its target audience, but it must be used with caution – both during its preparation and feeding with data and when presenting recommendations to clients, as insistent contact, poorly directed or without clear consent in data collection can generate discomfort and alienate the client. The algorithm can be enhanced with the crossing of AI technologies, especially machine learning. All of these techniques provide, as already mentioned, countless applications and bring several advantages to companies that use them, such as efficiency, due to: the low margin of error of the technologies; reduction of labor, especially in mechanical tasks, which can be done by a machine; standardization of processes and communication with clients; improvement of products and services; and through attracting new clients and more qualified Computer vision: the name itself denotes its concept, which is to give vision to a machine so that it becomes able to see certain things. It is used to recognize images and videos and extract data, patterns and the like from them. A practical and widely used example is facial recognition. professionals. Among its applications, we mention only for illustrative purposes: the referred chatbots; the use of algorithms to recruit professionals and select candidates with a profile closest to that sought; employee and company performance analysis; recommendation of content, products and services to users and clients; value forecasting and market analysis; credit analysis; traffic management and indication of alternative routes; decisionmaking; applications in smart homes; assistance in medical diagnosis; image recognition and biometrics; verification of identity and veracity of documents; autonomous vehicles; prevention of process failures. Note that these applications may demand and/or benefit from the use of other technologies that are not to be confused with AI, but which mutually enhance the potential. This is the case, for example, of drones, the Internet of Things and wearable devices. These are technologies that inevitably demand new and more complex processes, moreover because they considerably increase data production and touch on new privacy issues. In any case, all Artificial Intelligence requires specific due care and must follow rules that are already circulated locally and internationally. As the benefits of AI grow, the associated risks also accumulate. Many consequences of such risks can be anticipated and avoided in advance, but those that are unforeseen still exist, and action must be taken to avoid and minimize the damage. Thus, the use of AI should be made within a specific ethical framework and legal regulations, points that will be explored in the topics further below. The various applications of Artificial Intelligence bring unprecedented ethical challenges to human beings. This is amplified by the fact that the technology is relatively recent and is evolving at a rapid pace, including its high potential to change the way we live, impacting all areas of human life. Some of its ethical risks involve, for example, the proliferation of social stigma, the perpetration of fraud and disrespect for individuals' rights. Consider, for example, the possibility of attributing to the machine the decisionmaking process that would have social and collective impacts, as would be the case with its use in public institutions. There are even consequences of current applications that are not yet foreseen, mainly due to the difficulty of understanding and controlling an algorithm in its entirety, as well as the existence of applications that we are not yet aware of, but which already raise moral concerns. As highlighted by Nick Bostrom and Eliezer Yudkowsky¹³, the ethical issues of Artificial Intelligence, especially strong AI, differ from those existing in relation to other non-cognitive technologies, because: 1) even if its configuration and training are done properly, the result may not be fully predictable; 2) checking the system security is a challenge, as it must be done in all possible contexts in which AI can be applied; and 3) the ethical concern must also be a concern of the engineering area. There are already debates about the moral status of Artificial Intelligence itself. The cognitive capacity that the system may have (which allows autonomous decision-making, learning and development

independent of human intervention), raises the question of whether these machines should be considered themselves as moral beings¹⁴. In addition, ethical concerns about Artificial Intelligence also focus on the fact that its various applications can be used for the benefit of society, companies and citizens, but can also be used for harm. For these reasons, scholars on the theme, companies, international organizations and other important players in the field have indicated the need to observe ethical standards in the use of Artificial Intelligence. Today, some comprehensive ethical standards have already been developed and disseminated to create general limits for the use of AI. These are principles that have developed over the years and have contributed to delineating the limits and possibilities of applying AI and self-regulation, which are common in this field. Some companies, especially technology giants and global entities, already have solid Artificial Intelligence policies, which include a strong reference to principles. This is the case, for example, with Microsoft¹⁵, Google¹⁶ and the Organization for Economic Cooperation and Development (OCDE)¹⁷. Thus, there are principles and good ethical practices that are disseminated and accepted by the international community. These principles serve as the basis for the development of company policies, laws and guidelines from international organizations and for legislative discussion. In these policies and in laws already published on the subject matter, it is possible to notice the strong character of principles. There is actually a proliferation of principles, and each author and company treats them in a certain way. However, more in-depth analysis of these various principles allows us to identify that the multiple concepts all contain similar ideas. The concern, in general, is to make Artificial Intelligence responsible, transparent and, above all, trustworthy. Given the linearity of the logic underlying them, it is possible to group them into five general principles that should guide the use of Artificial Intelligence¹⁸, which are presented below. It should be noted at the outset that behind each of these principles are the notions of promoting human values and mitigating harm, putting the human at the center of the technology's applications. Before analyzing each of these ethical principles, it is important to highlight that they should be observed in all phases of AI use, from the formulation of ideas and project design, through systems architecture, programming and engineering, to its practical application and possible subsequent consequences, which leads us to the notion of ethics by design¹⁹. This requires, among other things, a multidisciplinary and diverse team, as will be discussed later, and whose training covers ethical issues, including for engineers, programmers and the like. Finally, we add that the use of AI and the respect for principles should not be based on a passive stance of avoiding risks and biases. In other words, it is not enough just to program without biases or to believe that the security of the system itself guarantees that risks and damages will not occur²⁰. Below, we will briefly explain what each of the principles consists of.

2.1. Beneficence The principle of beneficence indicates, in general terms, that Artificial Intelligence must be used in a beneficial way for humanity. Thus, it must be focused on the well-being of human beings, empowering as many people as possible, respecting human dignity and also being attentive to the sustainability of the planet²¹. In summary, it can be translated into the idea of doing only good.

2.2. Non-maleficence The principle of non-maleficence can be translated, in few words, into the idea that the use of AI should not cause harm. Thus, its misuse should be avoided, as would be the case of using it in an arms race. The development and application of AI technology should only occur within the limits of safety, and should prevent not only the violation of privacy, but also other fundamental rights. This principle also involves the assumption of the responsibility for working against possible technology risks²².

2.3. Autonomy The principle of autonomy seeks to emphasize that the Artificial Intelligence should be used in a way that it does not weaken or annihilate human autonomy, but that should, on the contrary, promote it. When using technology,

we give the machine a certain power of decision, but this needs to be done in a balanced way, that is, balancing the power delegated to the machine and the power maintained by us. Furthermore, the power to delegate decisions and to withdraw that delegation must always be held by humans. Otherwise, there is a risk that AI autonomy will undermine human autonomy. Based on these ideas, Floridi and Cowls refer to a “targetautonomy” or “decide-delegate” model²³.

2.4. Justice

The principle of justice is based on the idea that there is inequality of autonomy in society and, therefore, AI should be used to promote justice. It is a principle broadly addressed in different documents and varies according to the authors, but, in general, it indicates the need to eliminate any type of discrimination in the use and results of AI, in addition to promoting aspects such as prosperity, solidarity, justice, equity, diversity and equal access to benefits in society²⁴. One of the consequences of the principle of justice, especially in terms of non-discrimination and absence of prejudice, is the non-existence of biases throughout the processes and, above all, in the results. Biases in AI can be defined as a biased and disproportionate analysis that disadvantages a person or a group. Take as an example the AI credit analysis, which, in some cases, has generated discriminatory results: credit denied for reasons of race and geographic location, to the extent that black people and people living in poorer neighborhoods had their requests denied, even if, initially, the AI was not intentionally configured to make a decision based on these factors. As observed by Dora Kaufman²⁵, these errors may occur: before data collection, due to programmers’ decisions; in the data itself, which occurs in the event that the data are not representative and proportional to the portion of the population to which it refers; still in the data itself, but reproducing prejudices that exist in society; and also due to labeling errors (prior to supervised learning) or in data generation. In this way, the importance of the existence of diversity in the data and of adequate categorization and selection becomes clear. Otherwise, the decisions of the algorithm will reproduce the human biases already present, usually unconsciously, in the implementation and feeding of the technology. As we have already highlighted above, overcoming biases is not possible if a certain factor is ignored: a positive action is necessary for the algorithm to understand that some factors should not be regarded in a negative sense in the decision-making. Once the AI system has been fed with data, it might be difficult to identify the source of the bias. Algorithm auditing, which will be covered in this Guide, can be fundamental in this process of recognition and overcoming of bias.

2.5. Explicability

The principle of explicability complements and reinforces the four principles observed so far²⁶ and it can be divided into two main ideas: intelligibility and accountability, as explained by Floridi and Cowls. Intelligibility is concerned with how the AI system works. Thus, it is necessary to have transparency and the possibility of understanding, interpreting and explaining how the decision-making process works. Accountability is concerned with who is responsible for the way the system works. This principle of explicability is strongly related to the attempt that has intensified in recent years to reduce the black box aspect of algorithms, which is connected to the “lack of understanding of how the so-called data inputs generates the output data, how the system correlates the variables contained in the input data and the assigned weights (called ‘parameters’)”²⁷. Thus, as Dora Kaufman observes, the purpose is to understand and transmit in a clear and accessible manner to the user how the system reached a certain result. It happens that accuracy and transparency are inversely proportional factors in AI systems, which still represents a challenge for programmers. This becomes even more real, according to the complexity of systems: processes based on deep learning, for example, become increasingly harder to explain. In short, explicability, especially in terms of transparency, requires clear communication, through an accessible language to the consumer, and it is also recommended to use specific tools whenever possible²⁸. Project

traceability is also required, in order to be able to define what was done at each stage and throughout the entire process to explain the system and its decision-making to the user. As already observed, it is increasingly clear that AI will significantly change the way we live. The forecasts point to great impacts in all areas of life, with emphasis on the social, cultural and economic aspects. Technology can impact lifestyle, private choices and political decisions²⁹. Thus, ethical principles that delimit both the use of Artificial Intelligence and the legal aspects become even more important. In Europe, for example, a trend towards the regulation of technology has been observed and, as happened with the LGPD, which was inspired by the European Union's General Data Protection Regulation (GDPR), we believe that the treatment of AI in Brazil will follow a similar path. It was mainly from the 2000s onwards that saw stronger investment in this technology³⁰, causing it to develop at a faster pace. Over time, the potential of AI and its commercialization became increasingly real, but the discussion on regulation of AI only started to advance relatively recently. However, regulating technology is not an easy task, especially one such as Artificial Intelligence, which is evolving at a rapid pace, resulting in an equally rapid obsolescence and insufficiency of laws, and that will have even more profound impacts on society and the economy. While seeking to protect rights and values, it is necessary to leave room for technological development. However, it is unfeasible to presuppose a total dichotomy between innovation and legal treatment or the idea that the legislation would create barriers to economic progress. It is necessary and it is possible to find a balance. Many times, the adoption of similar principles and rules – whether from a state regulation or a self-regulation of industries and companies – enhances the attraction of investments, as it ensures a suitable environment for business development, protects Intellectual Property and individual rights. In light of this, what has in fact been observed is a greater rate of the proliferation of principles, the self-regulation of large technology companies and the establishment of policies by international entities, aspects addressed in the preceding item. We can also observe an increase of debates, proposal and discussion of bills, public forums, initiatives of working groups and research laboratories and other measures aimed at developing an efficient state regulation. The debate is more advanced, especially in developed countries, but there are still countries that find themselves in a scenario of insufficient legislation on the subject. This is the case of Brazil, which does not yet have a specific law addressing the use of Artificial Intelligence, but the discussion has been already been initiated and is expected still to expand, within the scope of discussions in society, the legislative and executive branches, the public sphere and among the entities and authorities interested in the discussion. Note that the discussion here is carried out considering specific rules on Artificial Intelligence and, in some cases, more comprehensive rules related to digital law. Nonetheless, this does not exclude the need to observe other rules also applicable, such as those of Intellectual Property, competition law, civil liability, consumer law, among other local and international legal rules. Due to the innumerable possibilities of using Artificial Intelligence, many other rules are mandatory depending on the case and the area of operation, as seen in the insurance, medical, pharmaceutical and financial areas. Therefore, we present below a general overview of the Brazilian and international scenarios for the regulation of Artificial Intelligence. As we shall see, a common point of the rules is to seek to ensure enforcement of ethical principles, guarantee respect for the rights of users, delimit the possibilities of using the technology and minimize risks. Note, however, that although some countries do not have laws on the subject and others have more general laws, this does not prevent the use of AI. On the one hand, the law itself establishes general principles and rules that already present the direction and delimitation of what must be done and what is prohibited in the use of the technology. This is the case, for example, of the constitutional

principles, which prohibit discrimination and ensure the protection of honor and image, and also other laws that address the issue, such as the LGPD and the Brazilian Internet Civil Framework. On the other hand, although the trend has been to regulate AI, this does not prevent companies from acting proactively to create their own rules and good practices to align their operations with the best standards of the market and compliance. After all, regulation, especially of a technology, does not operate solely in a top-down movement, in which the State creates laws to be followed by companies. Companies themselves can be proactive in this context, creating 3.1. The Brazilian scenario As mentioned, we still do not have in Brazil a specific law addressing Artificial Intelligence and even the bills of law on the subject are recent, proposed from 2019 onwards³³. Among these, Bill PL 21/2020, proposed in the House of Representatives, has gained some prominence in the national debate. The Bill “establishes foundations, principles and guidelines for the development and application of Artificial Intelligence in Brazil”. Throughout its articles, the Bill deals, among other things, with conceptualizations of important issues for Artificial Intelligence; introduces fundamentals for the use of AI, listing aspects that should be promoted with such use; presents the principles to be observed for responsible use of AI, which approach the aspects mentioned in item 2 of this Guide and also principles already established in the area of data protection. The other bills already proposed so far follow similar paths, despite having important differences. Mateus Fornasier and Norberto Knebel³⁴ note that such bills corroborate the trend towards social auditability of algorithms (accountability), indicating that algorithms must be justified in light of open and verifiable principles. The authors also state that the bills, in a way, reinforce the trend of self-regulation by the companies, as was seen with the LGPD, which, in its Article 50, provides that controllers and operators “may formulate rules of good practices and governance” in line with the principles and rules of law. Thus, in the context of AI regulation, “developers and operators are inserted in this same context of regulatory entity, at the internal level, both upon creating the systems and in their activities, enshrines the reality of regulation by design, that is, that the developers themselves are also responsible for the preservation of public order principles”³⁵. Legislative activity in the country generated a reaction from the Executive Branch, which also adopted some initiatives with the aim of regulating Artificial Intelligence. This was the case, for example, of the public consultation of the Ministry of Science, Technology and Innovation (MCTIC) on the Brazilian strategy for Artificial Intelligence³⁶ and the call to fund research centers for allocation in AI³⁷. In 2021, the Brazilian Strategy for Artificial Intelligence (EBIA) (Ordinance GM No. 4617/2021, modified by Ordinance MCT No. 4979/2021) was published. However, in addition to the restricted scope of the EBIA, which provides guidance only to the Federal Government, its laconic forecasts do not resolve several doubts and issues that exist in the country. Although it is an important measure and presents concerns such as the elaboration of ethical principles and standards, the promotion of investments in research and development in the field and provides, for example, that AI should benefit people and the planet, the Strategy was received with criticism by AI scholars. In this regard, it should be observed that the document arrived late, presents a level of maturity below expectations, especially in comparison with the plans of other countries, and attributes few roles to the government itself in the sense of innovating in AI³⁸. The document also lacks concreteness, as it does not contain clear responsibilities or budgetary considerations. The legal vacuum and legislative uncertainties, however, are not reasons enough to prevent the use of the technology in the country. Companies and organizations often create their own policies delimiting the parameters of AI (self-regulation), which is often based on internationally adopted rules and practices. In this context, a good practice is usually the adoption of stricter rules and more demanding parameters to avoid potential problems. A case that

exemplifies the use and self-regulation of the technology is that of the Brazilian Judiciary Branch. A survey carried out by the Center for Innovation, Administration and Research of the Judiciary Branch (CIAPJ) of the Fundação Getulio Vargas (FGV) indicates that half of the courts in the country have an AI project under development or even implemented³⁹, which is done seeking, among other things, greater efficiency, productivity and procedural speed. Thus, there are tools designed, for example, to categorize and search for case law, transcribe voice to text, identify whether a lawsuit is linked to any precedent, and semi-automatically generate procedural instruments. Aware of this movement, the National Council of Justice (CNJ) issued Resolution No. 332/2020, which provides for ethics, transparency and governance in the production and use of Artificial Intelligence in the Judiciary Branch, and Ordinance No. 271/2020, which regulates the use of Artificial Intelligence within the scope of the Judiciary Branch. Besides the specific regulation of AI – non-existent in Brazil –, there are some other laws applicable, directly and indirectly, to those who use the technology, with a focus on the LGPD and Internet Civil Framework. Because of their importance to AI, we will address these laws in a separate item. 3.2.

The International scenario Internationally, the regulatory debate on Artificial Intelligence is in a more advanced stage. It is possible to identify the issuance of more robust national plans as well as specific laws on AI, which address issues such as accountability and robotics. Even so, regulation is fragmented and there are also countries at a less advanced stage, for which it is necessary to outline more clearly the implications of AI, the limits and possibilities of action in society and in the economy, among other factors. In any case, the analysis of existing standards allows us to identify certain constants, such as the importance given to the principles that guide the use of an ethical, responsible and reliable Artificial Intelligence; the focus on humans and on protecting the planet; the need for algorithms to be explainable and transparent; technical and security robustness; human autonomy; and diversity, justice and equality. The debate on accountability in the field of AI has also made advances. Recently, in 2021, Europe released a proposal for a general regulation on AI with a risk-based approach. This is the Artificial Intelligence Act (AI Act), which sets out specific rules for the various systems and applications of the technology. The proposal is the outcome of an extensive process of debate and publication of guidelines by the European Commission. Previously, in April 2019, the Commission’s Independent High-Level Expert Group on Artificial Intelligence published the “Ethical Guidelines for Reliable Artificial Intelligence”. The document recognizes the potential of AI, but also pays attention to the risks, seeking to address how to deal with certain problems. Emphasizing that a reliable AI must be legal, ethical and robust, the document addresses issues such as accountability, human autonomy and systems oversight, as well as technical robustness. It also provides principles similar to those already covered in this Guide. The following year, the Commission published the White Paper “On Artificial Intelligence – A European approach to excellence and trust”, giving continuance to the guidelines to be followed and pointing out future regulatory actions. Other measures, such as public consultations, were adopted until reaching the aforementioned regulation proposal of 2021. In the United States, the Algorithmic Accountability Act, of 2019, defines which systems that involve personal data or make automated decisions are considered to be of high risk, presenting requisites to be followed in these cases. The Commercial Facial Recognition Privacy Act, also of 2019, prohibits the processing of facial recognition data, except in the event that the organization presents documentation on the capabilities and limitations of its technology and there is express affirmative consent from the end user preceded by notification about the reasonable uses for this type of data. In turn, the Self Drive Act, of 2017, establishes rules for testing and implementing automated cars, in addition to other provisions on the subject. Local governments

have also acted to regulate AI. The city of New York, for example, has approved the New York City Automated Decision Systems Task Force – ADS Task Force, aimed at government agencies that use algorithms in decision-making processes. In general, the purpose is to assess whether the algorithms are consistent with the purposes of making the city more just and equitable. The State of Washington is discussing a bill aimed at eliminating biases in automated decision-making processes. In the context of adopting national plans, China should be highlighted, which has an ambitious AI strategic development plan. Seeking to become the world’s leading country in implementation of AI technology by 2030, the New Generation Artificial Intelligence Plan (AIDP) was launched in 2017 and is focused on the areas of international competition, economic growth and social governance⁴⁰. Among other countries that also have plans, we can mention Australia, with the Artificial Intelligence Ethics Framework, of 2019, and Germany, with The German Strategy for Artificial Intelligence, of 2018. Artificial Intelligence is closely connected to other technologies, besides being based on large-volume data usage. One of the initial steps in programming and defining how an AI tool works is to determine what data it will rely on to work and generate the expected results. This is because AI uses a large amount of data – personal and even sensitive data⁴¹, oftentimes – and generates new data. This is not a simple task, but it is essential for the proper performance of the technology and, accordingly, for a company’s own performance, since the lack of definition or disorganization of such data can produce negative outcomes, either by delaying processes or generating undesired legal effects, or even increasing the risks triggered by the systems themselves. Therefore, the use of AI requires compliance with other legal rules, such as those related to data protection and cybersecurity. Such compliance is paramount and is related to the idea of resilience or robustness of the AI, that is, companies must have “technical robustness and compliance of their AI and its agility in all platforms and resistance against malicious agents”⁴². In addition, due to the creative, copyright and also industrial nature of AI, the discussion about Intellectual Property in this field becomes relevant. There are questions to which the IP regulatory framework already provides clear answers. Others, however, are still in the field of debate. In this regard, the European Parliament, for example, published a resolution in October 2020 to regulate the relationship between IP and AI. Thus, we shall analyze here the main rules on data protection, cybersecurity and Intellectual Property that must be followed by those who apply or intend to apply Artificial Intelligence technologies. We emphasize that, beyond the cold observance of the law, companies tend to benefit even more when a culture of respect for data and cybersecurity is created. In other words, all the chains of a company must be guided by a common logic of respect and attention to data protection standards and principles, such as collecting only what is necessary for the proposed purposes, adopting appropriate storage techniques, respecting security measures and the like. This point will be further explored in item 5 of this Guide.

4.1. Brief analysis of the regulatory scenario

Within the context of protection of personal data and the internet, two laws gain relevance. First, the General Law for the Protection of Personal Data (LGPD) (Law No. 13.709/2018)⁴³, which regulates the processing of personal data, establishing principles to be followed, rights of data subjects, rules for processing⁴⁴ (such as for collection, use and storage), responsibility of the actors involved in this process, sanctions, and even encourages the formulation of good practices and governance on the subject. Thus, the Law specifies the ways to protect the fundamental rights of freedom and privacy and the free development of the individual’s personality in the context of the use of personal data. Second, there is the Internet Civil Framework (MCI) (Law No. 12.965/2014), which is aimed at the use of the internet, setting out principles, users’ rights, aspects of registration and personal data, liability for damages, among other topics. In addition, there are other specific rules to be observed,

depending on the case and area of activity of each company, as already mentioned. In the international scenario, we highlight the General Data Protection Regulation (EU GDPR 2016/679), which regulates the processing of personal data in the context of the European Union. Considering that the LGPD was drawn strong inspiration from this regulation, the laws have great similarities. The rules of the GDPR must also be observed by those who, even in Brazil, process the personal data of data subjects from the European Union. Other international laws may also apply to Brazilian companies, depending on the origin of the data, the residence and citizenship of the data subjects and the commercial relationships established. This is the case, for example, of the California Consumer Privacy Rights Act, which will become effective as of July 2023, and of the Stop Hacks and Improve Electronic Data Security Act (New York's SHIELD Act). It is also worth mentioning the approval, in China, of the Personal Information Protection Law (PIPL), which bears great similarities with the GDPR and the LGPD.

4.2. Personal data protection

The use of AI applications, especially in light of the benefits they can generate for a company, can cause a desire for data collection in increasing amounts, which tends to be beneficial for machine learning and deep learning techniques, for example. However, careless collection can have negative consequences for the company, including the application of sanctions. Therefore, it is essential, in relation to any data collection, to pay attention to the rules on data protection set out in the LGPD. The Law provides for the limitation of the processing to the minimum necessary for the accomplishment of its purposes, with the scope of pertinent data, proportional and not excessive in relation to the purposes of the data processing. To this is added the idea that processing, including collection and use of the data, must comply with the legal rules, such as the requirement of a specific purpose duly informed to the data subject and that such processing must take place in a manner appropriate to the proposed purposes, among other rules that are established by the LGPD. It should also be noted that data cannot be stored indefinitely and without a purpose for its storage. There are specific rules determining the adequacy of the storage, the possibility of accessing the data by the data subject and, above all, a specific period for this storage. After the intended use, the data must, as a rule, be deleted. An alternative to this is irreversible anonymization, which removes the personal character of the data. Similarly to when we refer to the adoption of ethics by design, the perspective of privacy by design is also strongly recommended, in regard to the protection of data. In general terms, it refers to observing and respecting privacy at all stages of the system, from its inception. There are seven principles guiding the use of this technique, summarized below: The LGPD also affirmed the right to explanation for the field of personal data protection. This right applies to those who use Artificial Intelligence applications that use personal data. The Law provides that, “[the] data subject has the right to request the review of decisions taken solely on the basis of automated processing of personal data that affect their interests, including decisions aimed to define their personal, professional, consumer and credit profile or aspects of their personality.” Although the need for the review to be carried out by a human person has been removed from the Law, the doctrine has advocated a review under these terms⁴⁶. Human supervision is even an aspect that is recurrently highlighted as necessary for an ethically and legally responsible use of AI. This provision of the LGPD, which is similar to what is stated in Article 22 of the GDPR, also reinforces the need to keep records of processes, data usage, AI activities and algorithms in general.

4.3. Cybersecurity

With the concept of cybersecurity, the aim is to adopt technical and administrative measures that ensure the security and integrity of systems (software) and equipment (hardware), networks and digital infrastructure, as well as data protection⁴⁷ in the cyberspace, safe storage and technical robustness. In brief, the aim is to have an adequate and safe environment for the processing of personal data and for the

operation of AI systems, free from leaks and undue access, with the prevention of incidents such as accidental data destruction, programming errors, among others. In accordance with information security rules, it is necessary to ensure data confidentiality, integrity and availability. For this purpose, it is necessary to anticipate possible incidents, such as hacker invasion. This must be an ongoing concern accompanied by constant updating of security standards, which is reinforced by the fact that even techniques considered highly secure are, at some point, contested, as is the case with biometrics⁴⁸. In this respect, there are AI tools that can be used to detect threats and prevent their materialization, seeking solutions capable of overcoming a particular problem. AI solutions can be used, for example, to verify the identity of who is accessing a particular account or system and to check for unusual and/or inappropriate usage and access patterns. Appropriate hardware and software licenses can be expensive, but there are also open-source options available. Reinforcing the concern related to the subject and the need for concrete actions, the National Cyber Security Strategy⁴⁹ was approved in Brazil, in 2020, through Decree No. 10,222/2020, guiding the actions to be adopted by the Federal Government until 2023.

4.4. Intellectual Property

With the advances and the increase in the use of Artificial Intelligence, a subject that has gained prominence is its connection with intellectual property (IP). In this relationship, there are points of contact and tension, which are intensified by the strong industrial and/or artistic character of AI. On the one hand, IP provides legal tools to ensure protection for intellectual creations, such as for patenting technologies and for copyright. On the other hand, there are difficulties arising from the very functioning of AI: it is not always possible to clearly determine who is the creator of an AI technology, especially the more complex ones, which involve numerous codes and algorithms. Traceability of intellectual property rights becomes a difficult task in these scenarios. In the Brazilian regulatory context, the following laws gain relevance in the field of the connection between artificial intelligence and IP: Law No. 9,610/1998, known as the Copyright Law; Law No. 10,695/2003, which deals with violations of copyright; Law No. 9,609/1998, known as the Software Law, which deals with the protection of software intellectual property; Law No. 9,279/1996, referred to as the Industrial Property Law; and Law No. 11,484/2007, which establishes protective provisions for the topography of integrated circuits (chips). In the international context, it is worth highlighting the role of the European Parliament⁵⁰, which, in October 2020, published a resolution on “intellectual property rights related to the development of technologies related to artificial intelligence” (P9_TA(2020)0277). With technological development, new discussions have emerged, which are also accompanied by reflections on the extent to which IP laws will need to be changed. This is the case, for example, with the debate on attributing authorship to creations made by an AI system. Under the current Brazilian Copyright Law, an author is only the “individual who creates a literary, artistic or scientific work” (Article 11, caput, of Law no. 9.610/1998). Thus, in the current legislation there is no possibility of attributing authorship to the machine. However, going beyond the current regulation, there is a reflection on the theme in the academic sphere⁵¹, which may, in the future, lead to changes in the law and new regulations as the technology advances. We already have concrete examples of this issue. In 2016, from the analysis and identification of patterns in paintings by the painter Rembrandt, an algorithm created a new painting that became known as The Next Rembrandt⁵². Another example is the science fiction short film ‘Sunspring’, whose screenplay was written by AI system⁵³ from the analysis of numerous film scripts of the same category. This discussion delves into machine learning and deep learning systems which, after being taught, continue to learn on their own new ways to find the solution to a problem and to give the answers sought. The more complex the technology, as in the case of deep learning and neural networks, the greater its distance

from its creator and the more difficult it is to understand how the machine reached a certain result, making it difficult to assign the referred rights. The level of human interaction with the system is also often identified as an important factor in this equation. Finally, AI has also contributed to the identification and processing of intellectual property rights more quickly than human beings, reducing costs and optimizing time. This is the case, for example, of two YouTube systems: the Copyright Match Tool, which identifies matches or possible matches of videos on the platform, to be analyzed by those who request removal by copyright; and the ContentID, which analyzes the videos posted on the platform and identifies if there is use of any content of a copyright owner, in which case the owner will have certain options, including blocking the viewing of the video. As observed throughout the previous chapters, Artificial Intelligence is already a reality present in a large number of organizations as well as in people's daily lives. Many companies already use AI in their procedures and products or are exploring its potential. The absence of specific regulation on the technology in Brazil is not enough reason to prevent its use. Based on constitutional principles, other laws and especially the framework of principles internationally widespread on AI, the regulatory debates carried out and operation of companies already advanced in this process, it is possible to infer certain concrete measures to be taken for an ethical, responsible, and reliable implementation of AI. Thus, we shall present, in this item, recommendations and good practices to be observed along this path. These are measures that are related to ethical principles and whose consideration is necessary in all stages of a company's digital transformation, from the beginning of planning AI incorporation to its results and uses in the company's products.

5.1. A culture of data and ethical, responsible, and reliable performance of operations

First, it is essential to develop a culture focused on Artificial Intelligence, covering issues such as data protection and cybersecurity. We do not ignore that a cultural change in the company is not a simple task. However, organizations have in their favor the fact that the digital transformation has been taking place for some years and people in general are already able to embrace and integrate technology into their daily lives, although in simpler ways. Therefore, this change in the internal culture comes in the midst of the flow of external transformations and amounts to adapting our way of living, working, generating products, among other things. For Patrícia Prado, there are three fundamental points to be observed in this cultural change⁵⁴. First, the change must come from the company's leaders, who need to "understand what this culture change means and participate in it"⁵⁵. In other words, it is necessary that the concern about data and cybersecurity and the cultural change are noticeable in the actions, plans and statements of the company's directors that will gradually transmit and strengthen this culture to the other employees. Second, Prado highlights the need to "choose metrics based on key business objectives". Accordingly, the company's objectives must be well defined, as well as the operating strategy to achieve them and the measures for their constant evaluation. Finally, the author points out that it is necessary to build a "reliable and transparent database", which includes joint action between the business sectors and the technology sector. We have addressed this point above, by mentioning the need to define and organize the data already during preparation of the AI. Here, we point out the need for such care to be observed throughout the use of AI, even impacting the form of relationship between members of the company. This culture encompasses not only aspects directly linked to data, but also requires respect for ethical principles on Artificial Intelligence. These principles, mentioned in item 2, must be respected at all stages of the AI. Thus, they need to guide the process of planning objectives and strategies, so that issues such as damage prevention are already considered in this project. As we will see, the principles are not as abstract as they might appear at first reading. In fact, they relate directly to good practices that will be addressed here, and which seek to ensure factors such

as transparency, accountability, responsibility, and assurance of the review of decisions. 5.2. Internal mapping and strategy definition In order to develop a culture in the sense mentioned in the previous item and to implement AI projects, it is essential that an internal mapping is prepared. Before applying changes and including new technologies, it is essential to analyze what the intended objectives are, which strategies will be adopted to achieve them, what tools and infrastructure are available, what level of qualification and training of the team is already part of the company, and, mainly, what problems are faced throughout the processes. AI solutions must be well targeted to specific issues and come with cross-sector support. Otherwise, they will not deliver the expected benefits. In other words, it is necessary to identify where technology can be used to improve the company's processes, which area requires changes and can benefit most from the transformation, especially in a scenario where there are limited resources. This also involves analysis of already existing results and sincere conversation with all the employees, who are involved in the day-to-day activities and are aware of the details of the company, and who will thus provide more accurate insights, pointing out needs for improvement and bottlenecks. From there, the strategy can be designed, which will certainly involve the implementation of some changes, such as hiring and/or training of personnel, enhancing computer infrastructure, purchasing software licenses and purchasing equipment. In general, there will be a redefinition of the business model, which will be based, even partially, on AI. The products will be distinguished and further improved. One thing to be considered while still in strategic planning is the need to dedicate time to the execution of pilot projects, in order to analyze whether the technology is well adapted, whether it is generating the expected results and which aspects should be improved before the actual execution. It is a project to be thought out and applied with caution, mapping and with the mitigation of risks in mind. Finally, we emphasize that it is desirable that this internal mapping be redone with some regularity, in order to identify flaws and gaps. 5.3. Chart of Professionals /inclusiveness In the sequence of the mapping and definition of the company's strategy, it will be necessary to focus on the adequate body of professionals. A team responsible for AI must be organized in the company, in charge of its planning, monitoring and execution. This team must involve, among others, engineers, data scientists, product manager, marketing analyst, person in charge of personal data processing (Data Protection Officer – DPO), and a legal team with interdisciplinary knowledge. An available alternative is the contracting of other companies to perform one, some or all of the steps of implementing and executing projects, which will not require a full AI team in the company. This can be useful for small companies, which cannot yet afford this type of investment; for those that want to take it slow and test AI solutions before incurring huge financial expenses, hiring personnel and changing their infrastructure; or also for large companies that, despite the high number of employees, might not have expertise in one or more areas essential for AI. For all companies, regardless of their size, hiring an external professional responsible for the organization's compliance is a positive step, as the person will be someone with a posture that is not biased by the company's procedures and will have greater capacity and freedom to point out deficits and recommend improvements. A company tends to benefit from a body of professionals with diverse training and backgrounds⁵⁶, which also includes aspects of diversity, such as race and gender. This will allow everyone to contribute from different perspectives, which will prevent risks – as a wider array of people will be analyzing the possible consequences of a project – and will increase the potential for using the technology. Thus, although the formation of this diverse and specific group may demand some investment, it will prove to be a great competitive advantage. The diversity will also demonstrate its benefits upon formulation and setting of algorithms, allowing the identification of biases from the perspective of gender, race,

age, nationality, among others. Thus, the company takes an important step to ensure respect for the principle of justice.

5.4. Personnel training Even with the hiring of specialized personnel, it is also important to invest in the qualification and training of current employees, so that everyone is integrated with the new technologies used in the company. It will be necessary to present and teach how to use the system, provide training on ethical and legal aspects, among others.

5.5. Creation of comprehensive privacy and data policy The creation of a privacy policy aimed at the user that makes clear all forms of processing of personal data is already a requirement of the LGPD. In the context of Artificial Intelligence, this will continue to be a duty of companies, but such documents will have to be improved in order to also make clear the procedures involving technology. This will meet a requirement for transparency and will reinforce reliability, in addition to serving to standardize the company's behavior. Thus, in addition to listing all the processing of personal data carried out by the organization in its wide variety of operating contexts, it will be necessary to explain the uses of AI and the way in which the data relate to it. The internal mapping and definition of objectives and strategies will be fundamental at this time, as they will serve as a complementary guide to the policy. The document should contain a presentation of possible risks and their levels, followed by actions to mitigate them. Issues such as mechanisms for systems oversight, planning in cases of incidents and methods for compliance with ethical principles and legal rules should also be included. The document must be easily accessible by the data subjects/user of the technology and present simple and easy-to-understand language, in addition to allowing the data subjects to effectively exercise their rights related to data protection.

5.6. Impact analysis and risk assessment As already mentioned, the use of AI applications requires constant attention to identify possible risks and act in order to mitigate them. It is necessary to always adopt a preventive stance. There are different parameters for identifying risk levels and the requirements for each. Allianz, for example, identifies three levels of risk in AI applications and in the use of personal data, categorized according to the difficulties in overcoming them and their probability of causing harm⁵⁷ :

- 1) Low risk: there may be some risks and inconveniences, but overcoming them tends to be simple and the occurrence of errors is quite low;
- 2) Medium risk: even though the probability of incidence is low, there are significant chances of inconveniences, whose overcoming brings some difficulties;
- 3) High risk: the inconveniences and consequences are more serious, with major difficulty to overcome them, and they might even be irreversible. The probability of damage is high.

The risks and impacts of AI vary both by the technology itself and context. Therefore, determining the level of risk and human involvement must be done on a case-by-case basis. For this, Allianz⁵⁸ recommends considering the following aspects:

Data Category The use of sensitive data automatically leads to a medium level of risk, a trend that is often followed by data from social networks as well. For example, because of the amount of sensitive data and the impact of decisions, a health insurance company is classified as high risk.

Type of client The use of personal data from vulnerable groups also carries a medium risk;

Impact on the client Legal consequences, impacts of financial aspects and long-term decisions must be taken into account. Thus, an automated decision generates an average risk, which can be reduced by the possibility of explaining, challenging and even reviewing the decision. Financial issues, when problematic, increase risk, as do irreversible long-term decisions.

Field of application Issues such as advertising without profiling and automating internal processes are often low risk, but it is possible that a combination of several low risk applications creates a high risk scenario. Mitigation of these risks involves aspects already mentioned, such as applying technologies that have an adequate level of development and maturity; ensuring that technical and cybersecurity requirements are respected and systems are updated; and anticipating and preventing the

occurrence of biases and discrimination, which involves comprehensive training on the system and feeding it with varied data. As stated, there are other parameters to identify, categorize and regulate AI applications according to the actual risks. The proposed regulation of Artificial Intelligence in the European Union - the AI Act mentioned in item 3.2. of this manual - establishes a risk-based approach, but without creating unnecessary restrictions. The idea of forecasts, in general, is to deal with situations where there is justified concern or that such concern can be reasonably anticipated in the near future, so that the AI is reliable, safe, respects legal rules and generates benefits for European citizens.⁵⁹ Therefore, the proposal seeks to: deal with the specific risks of AI applications; define which systems are high risk and which requisites must be met in these cases; propose the conducting of a compliance assessment prior to putting a high-risk AI into service or on the market; and also to propose a governance structure at the European and national level. In this way, the proposal presents four different risk levels, ranging from low to unacceptable risk. Each one demands the observance of specific rules, and requirements are expressly provided for in the proposal. There are even some exceptions to the general rules of risk classification and restriction and/ or prohibition of use. Presented below is the outline⁶⁰ for each of the risk levels: Unacceptable risk Particularly harmful AI applications and prohibited for violating values of the European Union, such as systems for subliminal manipulation of individuals and systems for real time distance biometric identification at public sites for security purposes. High risk Systems that pose a high risk to health, safety and fundamental rights of people. They are subject to predictable mandatory requisites to ensure safety and respect of fundamental rights throughout the system lifecycle; Limited risk Systems subject to minimal transparency obligations, as in the case of chatbots; Low risk Applications with free use in the European market;

5.7. Algorithm auditing

In general, algorithm auditing aims to “evaluate the consistency of the models in relation to the principles and standards in force, focusing on the review of source codes and the impacts of the ‘outputs’ of the algorithms (predictions indicated by the models)”⁶¹. In other words, the auditing of algorithms seeks to analyze compliance with legal rules, such as data protection and ethical standards, added to the adequacy of cybersecurity techniques and requirements. The focus is on the practical aspect, that is, if and how the rules and principles are applied in the systems and processes. In addition, the algorithm itself is also analyzed, how it was programmed and which code was used⁶², in addition to the results obtained, in order to ensure that they are not discriminatory. In short, this is an important governance and compliance mechanism, aimed at analyzing AI behavior. With this broad objective in mind, some examples of specific aspects to be verified and some audit tasks are: “to support the decision-making, visualize and monitor the results; inform users of why a decision was made and how to challenge it; alleviate human suffering by anticipating and mitigating damage; allocate responsibilities; and balance conflicts of interest”⁶³. The audit can be carried out by a government agency, by an outsourced professional hired for this function, or it can be a task specifically assigned in multilateral organizations⁶⁴. It is important that it be carried out independently from the other tasks of the company. Note, however, that auditing is not and should not be seen as the single and most important mechanism for ethical and legal compliance. It is a fundamental mechanism that is strongly related to the idea of transparency, but which should be one among several measures and good practices adopted by the company to ensure ethical, responsible and reliable use of AI. There are even some issues and obstacles to be observed in an audit, such as the difficulty of interpreting an algorithm, the different behavior of the algorithm in different contexts⁶⁵ and its mutation in contexts of machine learning and deep learning. Thus, for ethics-based auditing to be viable and effective, Jacob Mokander and Luciano Floridi point out that it must: (i) be a continuous process; (ii) be Good Practices in

Artificial Intelligence - A Guideline 50 part of the sociotechnical system as a whole, and not something isolated; (iii) be seen as a dialectical process, and not a static and preconceived process, ensuring that the appropriate questions and expected answers are given according to that context; (iv) be aligned with organizational policies and incentives; and, reinforcing the importance of ethics by design (v) “interpretability and robustness must be incorporated into systems from the beginning. Ethics-based auditing supports this purpose by providing active feedback to the continuous process of (re)design”⁶⁶. In the Brazilian data protection scenario, the provisions of the LGPD, focusing on the principle of transparency, the provisions on accountability and the right to review automated decisions, all reinforce the idea of auditing. There is an express provision attributing competence to the Brazilian National Data Protection Authority (ANPD) to “perform an audit to verify discriminatory aspects in the automated processing of personal data” (Article 20, § 2) in the event that the controller does not provide “clear and adequate information regarding the criteria and procedures used for the automated decision” (Article 20, § 1) and generic provision in Article 55-J, XVI. 5.8. Report preparation Finally, it is recommended that reports are prepared detailing how the systems were developed and applied, which processes were implemented and what results were obtained. The preparation and maintenance of up-to-date documents and reports is beneficial for any potential audit and for meeting the accountability requirements. This will also provide clearer control and analysis of processes and systems. Thus, in line with the internal mapping, continuous control of systems and “retrospective impact assessments, carried out in the form of self-control and/or third-party control”⁶⁷, contribute to maintaining security and respect for ethical principles and legal rules. As observed by Wolfgang Hoffmann-Riem: In this item, we briefly mention some successful examples of principled approaches and concrete uses of the technology that forms the scope of this manual. The objective is to point out, on the one hand, that there is room for success with the use of AI, while on the other, to ascertain what these concrete experiences can teach us. First of all, we return to an idea already mentioned briefly: that international organizations have also played an important role in this context. The OECD, for example, brings a principled approach to the technology with the aim of promoting an AI that is “innovative and reliable and respectful of human rights and democratic values”. For the organization, responsible use of reliable AI involves observing 5 complementary principles, which can be summarized in the following ideas⁶⁹: i) be beneficial to people and the planet, stimulating sustainable development and well-being; ii) respect for the Rule of Law and adoption of safeguards to guarantee a fair and equitable society; iii) transparency and explanation; iv) robustness and security; v) accountability. These principles have been incorporated by an increasing number of countries and have served as the basis for the elaboration of principled approaches by countries and organizations, such as the G20. This shows us the importance of a unified perspective of principles and the potential of its existence. A concrete example of positive application was observed through Amazon’s Alexa. The famous virtual assistant was the target of concern from parents and associations dedicated to the rights of children who noticed a cold and protocol-based communication in minors. Through a politeness feature strategy, the company programmed the virtual assistant to encourage children to say things like “please” and “thank you”⁷⁰. This case illustrates the attention to the principle of beneficence, focusing the use of AI to be aimed at the welfare and benefits to humanity, in addition to exemplifying the possibility of improvement and revision of technology as it is used. It also demonstrates how a use of ethics by design can work, as these aspects had to be considered at the time of designing the technology. Finally, it is worth mentioning briefly that there are also negative examples of the use of AI. Image recognition with discriminatory results; the unexpected behavior of chatbots, who end up learning prejudiced

speech; inappropriate content recommendations; and the generation of deepfakes and the influence of this category of information on AI systems are some of the negative results to which companies should already pay attention to adopt preventive action now. Even without specific comprehensive regulation on AI, ethical principles, international regulations and even national laws on related topics indicate paths that must be followed by those who already wish to adopt the technology. With its potential already quite clear, Artificial Intelligence will bring many benefits to organizations, and those that start preparing now will have a great competitive advantage over other companies, in addition to already taking action to avoid risks. Bearing this in mind, we have prepared below, in a simplified way, the main steps that should be taken proactively by companies that have encountered Artificial Intelligence, are considering integrating it into their processes and products and do not yet know which path to follow.

1. Develop a data culture and pay attention to the ethical principles of AI at all stages of its application, from planning to its actual use and analysis of results. As mentioned, several principles have emerged to delimit and guide the possibilities for using AI. An analysis of these principles indicates a consensus of ideas to make Artificial Intelligence accountable, transparent and reliable. These ideas are translated into the principles summarized briefly in the table below: Beneficence AI must be used for the benefit of Mankind, focusing on the well-being of people, respecting human dignity and paying attention to the planet's sustainability. Non-maleficence Use of AI should not cause harm, and it is necessary to anticipate and prevent risks and adopt safety techniques. Autonomy AI may not weaken or eliminate human authority. Users must be assured the autonomy. AI should promote justice, exclude any prejudice, discrimination and biases and should promote aspects such as solidarity, equity and diversity. Justice AI requires that its use be intelligible (user should be able to understand how the system works) and there must be accountability (responsibility)
2. Map the company's personnel, resources and rules to identify gaps and areas where investment should be increased and processing should be enhanced. It is recommended to hire specialized and diverse personnel, in addition to training the entire workforce of the company;
3. Create policies for the use of AI, data protection, security and other aspects, in order to make clear the general technical, behavioral and security standards to be observed by the company as a whole. It may be necessary to redefine or adapt the planning and business model;
4. Create an AI governance in the company to be observed at all stages involving the technology and its projects, such as strategy, implementation and monitoring. It may be appropriate to create "separate governance committees and councils to deal with the exclusive risks and complexities associated with AI and data"⁷¹;
5. Encourage studies and projects aimed at delivering AI solutions through the creation of a framework for this purpose, which should be guided by clear guidelines be supplied with appropriate tools and investment⁷²;
6. Invest in risk analysis, creating a responsible structure that is capable of identifying risks in advance and acting to mitigate and avoid them, which may involve the very use of algorithms to identify and manage risks. This includes a joint review with cybersecurity teams and requires attention to aspects of ethical integrity and technical robustness;
7. Prepare and maintain documents and reports on the creation of algorithms, their application and their results. This favors continuous analyses, allows for the modification of systems that produce unwanted results, helps to prevent risks and proves to be useful in carrying out a potential audit.

[157. AI, Data Protection & Privacy 2024 legislation](#)

[Lopes Pinto, Nagasse Advogados](#) is based in São Paulo. The firm provides expertise across many areas, including corporate and business law, tax and planning, data protection (LGPD, GDPR and PIPL), contracts, regulation, digital assets, blockchain, transportation, logistics, labour,

infrastructure, agribusiness, banking and finance, bioscience, civil law, corporate governance, compliance, tech law, and legal risks. The team of highly skilled professionals possesses in-depth experience of national and multinational companies and law firms, and the modus operandi of organisations and businesses. Lopes Pinto, Nagasse Advogados prides itself on being a highly ethical firm, focused on achieving results and providing excellent service to its clients. Since 2006, it has been recognised as one of the most highly regarded law firms by *Época*, a Brazilian news and analysis magazine.

Close All

1. Basic National Regime

1.1 Laws

The Development of Data Protection Legislation in Brazil

In Brazil, data protection regulation – especially protection of personal data – stems from the Constitution (Article 5, X): “intimacy, private life, honour, and image of people are inviolable, ensuring the right to compensation for material or moral damage resulting from their violation”.

The Consumer Protection Code (Law 8,078/93) also has rules on “personal information”, and introduced, for the first time, a standard that allows consumers to have access to the data that a company holds about them and to request its update or correction. These concepts were expanded by Decree 7,962/13, which now talks about “data security”, an idea close to another concept, that of “personal data as part of an individual’s assets”.

In 2013, the Civil Rights Framework for the Internet was approved (Law 12,965/14). Even though it was aimed at activities on the internet, it introduced relevant concepts, such as “net neutrality” and “active protection of personal data”, into the wider legal/regulatory landscape in Brazil.

In 2018, with Law 13,709, the General Data Protection Law (LGPD), introduced rules designed to regulate, protect, and discipline the treatment and security of personal data in Brazil. Based almost entirely on the GDPR of the European Union, the LGPD only entered into force in September 2020, except for its penalties.

In 2022, the protection of personal data was explicitly included in the Federal Constitution as a fundamental right (Article 5, LXXIX).

With the advancement of AI, Brazil decided to try to regulate the matter. To this end, Bill 2,388/23 emerged, which, in line with global trends, is based on the most widely accepted principles in this area:

recommendations and ethical principles for creating standards of conduct;

rules on governance and compliance;

a certain degree of normative liberality in the practice of AI; and

the establishment of rights and obligations with the aim of mitigating risks and ensuring reliable use of AI systems.

1.2 Regulators

Principal and Derivative (Sector-Specific) Regulators

The Brazilian regulatory model is largely based on the GDPR, and adopts a similar “vertically centralised” regulatory system. Regulation is part of a “hard core”, represented by the Constitution, which runs along the central axis (legal framework) and ends in the branches (regulation and rules).

This model admits some radicality, in which the regulation assumes a “horizontal” profile, reaching not only those that directly engage with the processing of personal data, but the entities that exercise some regulation over data processors.

Thus, there are two classes of regulators: the principal regulators, which receive prerogatives from the primary legislation (Constitution and LGPD), and the derivative regulators, whose regulatory power stems from the fact that the activities of a given data processor are under their regulation.

The main regulator is the Autoridade Nacional de Proteção de Dados (ANPD), as provided for in the LGPD and approved by Decree 10,474/20. Recently, the ANPD has gained the status of “agency” and has begun to make up part of the structure of the Ministry of Justice. Among derived regulators there are some entities, such as the Banco Central do Brasil (Law 4,595/64), the Agência Nacional de Transportes Terrestres (ANTT) (Law 10,233/01) and the Comissão de Valores Mobiliários (CVM) (Law 6,385/76).

Although the ANPD argues that the punitive measures referred to in the LGPD are of exclusive application by the main regulator, this is not exactly true, as there are penalties substantially like those of the LGPD that can be imposed by secondary regulators. Thus, the sanctions applicable by the ANPD can perfectly coexist with the sanctions imposed by a secondary regulator, especially if the facts assessed by both regulators are related to the protection of personal data.

AI

As for AI, the matter gets complicated. While the ANPD wants to take over the regulation of AI, due to the proximity of the subjects within its competence (personal data) to the topics related to AI systems, other voices say that regulation should take place in the form of a “committee”, composed of other government bodies. Bill 2,388 is silent on the topic, limiting itself to referring to a “competent authority”.

In the EU, the AI Law seems to indicate a very strong desire for the bloc to become a “global regulator” on AI issues, given the repercussions of its regulations on other countries, including Brazil. Furthermore, the AI Act shows a well-defined focus on technology risks, the so-called “own risks”, especially its effects on disinformation, innovation, jobs and the interests of governments and States.

The topic of “deepfakes” is one of these own risks. People are misled by fraudulent video and audio content, created with the help of AI. Precisely for this reason, in Brazil, Bill 5,241/23 is being processed, which establishes the use of deepfake audiovisual content as a crime.

1.3 Administration and Enforcement Process

Brazilian legislation on personal data establishes a process for sanctions and a means to challenge such sanctions. This begins with the administrative process carried out by the ANPD, which verifies an organisation’s adherence to the LGPD.

The process may be monitoring, guidance, prevention or repression. If the supervised agent does not adjust its procedures, the regulator may apply the sanctions. Even in this case, regulatory authorities and agents may sign a conduct adjustment, to be completed within a certain period.

In the event of a penalty, the regulator must comply with the following criteria:

compliance with the general interest;

adequacy between means and purposes, formalities essential to the guarantee of rights, simple forms;

respect for the rights of interested parties;

official operation of the administrative process (without prejudice to the actions of the interested parties); and

legal interpretation to ensure the fulfilment of the public purpose.

The regulated organisation has means of defence; however, ANPD Resolution 1/20 begins by declaring (Article 38) that there is no way to appeal the decision of the regulator that opened the sanctioning process, which calls into question the right to appeal. First, the Constitution says that no law can exclude from judicial assessment an injury or threat to the law (Article 5, XXXV); second, the Constitution affirms (Article 5, LV) the principle of broad defence; and third, the Federal Administrative Procedure Law (Article 2, paragraph 1, X), applicable to proceedings before the regulatory authorities, determines that it is the right of the interested party to appeal as it deems necessary.

According to the infraction notice, the regulated agent has ten working days to defend itself, including with evidence and other elements; then, the regulated agent has ten more working days, before the instruction report, to respond to the evidence and other elements collected; finally, the agent will be called to comply with the decision, or to make a final appeal, within ten working days, addressed to the Board of Directors of the ANPD.

If the regulated agent does not agree with the decision of the council, it may appeal to the judiciary. Since the ANPD is now part of the structure of the Ministry of Justice, discussion has gained momentum over whether, in the case of a final decision of the ANPD, and before taking the matter to the judiciary, the penalised agent could submit an improper hierarchical appeal – the legislation seems to allow this exit, but only time will tell.

AI

As there is still no legal framework for AI in Brazil, it is not possible to say that the country has a system of sanctions and resources focused on AI issues. This does not mean, however, that there is an absolute vacuum. If an AI issue has to do with personal data, it is always possible to submit it to the ANPD. If the issue is related to the financial market, it is possible to take it to the CVM or Central Bank for examination.

1.4 Multilateral and Subnational Issues

The Brazilian national regime for the protection and guarantee of personal data is quite recent (2018), even though discussions on the subject began more than a decade ago.

Brazilian legislation has a low level of interaction with the legislation of members of the Asia-Pacific Economic Cooperation (APEC), but many issues have been discussed bilaterally. One of them is the protection of personal data in cross-border trade; for example, considering the “inherent risks” of unregulated transfers, parity of legal standards, alignment between commercial partners and alternative means of conflict resolution.

The interaction between Brazil and the EU is far greater. Of particular note is a difference in the interpretation of jurisdiction over data processing. For Brazil, personal data processing is subject to the LGPD if, as a fundamental concept, this processing occurs within the national territory. Under the GDPR, however, the processing (or processing) may still fall under EU regulation even if carried out by a controller outside the EU, if it is sufficiently linked to the activities of an establishment in an EU country.

Brazil has expressed interest in joining the OECD, but to do so it would have to make progress in personal data protection and the regulation of fair and legal data processing acts. The case of the European Directive on Electronic Privacy is emblematic: the EU is already discussing escalating the issue to more complex legislation, but Brazil does not even have fundamental guidelines on the subject.

1.5 Major NGOs and Self-Regulatory Organisations

Data protection and security in Brazil is still a very recent issue, and therefore there is not a significant number of independent bodies dedicated to maintaining data protection and security standards, especially personal data (eg, self-regulatory organisations (SROs) and others).

In recent months, some initiatives have been observed in this area. For example: the case of the self-regulation agreement between the CVM and ANBIMA (an association that brings together financial and capital market entities). Although focused on the activities of fund management, the document covers some concepts that can be applied to the processing of personal data.

As for AI, the subject currently has no defined contours. As the sector’s promised legal framework has not yet been put in place, there is not even a defined regulatory process, let alone something like self-regulation. It is possible that, with the EU’s decision to approve the AI Act, Brazil will be encouraged to accelerate the creation of the a legal framework for the sector.

1.6 System Characteristics

Brazil has adopted an “omnibus” regime for data protection: legislation of higher origin, linked to a constitutional (federal) rule, regulates security, processing and privacy issues related to personal data.

It was not easy to approve the LGPD, and it has not been easy to ensure that its standards are applied. This is due to social and cultural differences, but also to Brazil’s legislative system. This is the reason for the “omnibus” law, which helps to reduce legislative disparities and the risk of decisions that could “implode” the concepts and principles related to personal data and its protection. Brazil, unlike the EU, did not have a conceptual legacy for protecting privacy and its relationship with personal data. That is why it chose the option of a “national” law, a framework that is both engine and booster, but with a bias that inhibits local and sectoral initiatives.

Another point in favour of the Brazilian model is that, with “national” law, regulation can occur vertically or horizontally, and cover different sectors. The market may complain about Brazilian

legislation, but it is undeniable that the “lex omnibus” derived more from an economic and historical context than from a government option. But there is still a long way to go. With regard to AI, NFTs, regulated businesses and so-called “paranational” relationships, EU and US regulation is more effective, deeper, and tougher. Mechanisms such as “data sharing agreements”, “joint processing treaties”, and others were not even considered in Brazil. Measures such as “external data control” and “approach supervision” are also not even discussed, and this creates a negative context for the LGPD.

1.7 Key Developments

In the last twelve months - even though other countries have made great strides towards regulating highly relevant aspects of personal data, AI, NFTs, digital markets and other subjects – Brazil has also taken some important steps:

17 states already have internal standards that regulate the LGPD within their limits;

AI (even without a legal framework) has advanced in many sectors (facial recognition, credit granting, medical diagnoses, distance learning, and technological innovation);

the LGPD has been increasingly used in labour court rulings and consumer relations (in 2023 there were around 1,200 rulings, while in 2022 there were only around 600);

the ANPD has published the Regulation on Dosimetry and Application of Administrative Sanctions (Resolution 4/23) related to infractions involving personal data;

the ANPD published its guide for processing personal data for academic purposes and research;

discussions have begun about the “monetisation of personal data”, a controversial topic full of controversies (Bill 234/23); and

the ANPD published the updated and consolidated version of its guidance on definitions of personal data processing agents and data protection officers (DPOs).

1.8 Significant Pending Changes, Hot Topics and Issues

In the coming months, many hot topics will be revisited. Among these are:

“monetisation of personal data”;

“sharing” personal data contracts;

“datapharma” and its regulation (sensitive data);

personal data in the banking sector;

retention of personal data codes;

self-regulation (SROs) and partial self-regulation (ASROs);

dispute resolution chambers for matters of personal data;

DPOs and work relationships;

compliance for personal data;

AI regulation;
data governance at companies;
NFTs and personal data;
personal data market and regulation; and
contracts for the representation of personal data.

Safe-Harbour Agreements and the Schrems Case

A highly significant issue concerns the decision in the Schrems case. As this case could have many future repercussions in Brazil and other countries, it is important to know a little more about it. Austrian privacy advocate Max Schrems questioned the security of the transfer of his personal data through a famous social media platform, carried out at the time under the EU-US safe-harbour agreement. Schrems argued that Edward Snowden's revelations about US intelligence agencies indicated a lack of protection against surveillance under US law.

Therefore, the CJEU invalidated the safe harbour due to the lack of adequate safeguards required by EU law. The EU and the US then negotiated a replacement agreement (the "Privacy Shield"), created as a new recognised basis for data flows in compliance with EU law. But this second arrangement was also later invalidated by the EU. The court concluded that certain programmes that give US authorities access to personal data transferred from the EU for national security purposes create limits to the protection of that data. Such limits indicate a lack of protection that is "essentially equivalent" to EU law and means that data subjects may have no rights actionable in courts against US authorities.

One of the alternatives that emerged was the adoption of "standard clauses", which were not invalidated by the CJEU, although the court's recommendation was to assess, in each case, the integrity of the protection offered by them, with the possibility of adjustments or amendments.

Transfer Risk Assessments

Many countries – such as the United Kingdom, through the Information Commissioner's Office (ICO) – have decided to adopt a very useful instrument, the transfer risk assessment (TRA). This instrument considers two alternatives: a comparison between the situation of data subjects and their data in, for example, the UK (ICO model) or a comparison of a country's laws and practices with those in the data importer's jurisdiction (European Data Protection Board model). This involves both knowing the extent to which personal data protection safeguards are similar to those of the domestic regime and questions of access by third parties, especially governments.

2. Fundamental Laws

2.1 Omnibus Laws and General Requirements

The term "omnibus law" generally refers to comprehensive piece of legislation that covers a wide range of issues or policies. These laws are often enacted to simplify and consolidate laws or regulations into a single set, facilitating their implementation. General laws are typically employed to address complex or interrelated issues that may require multiple changes to existing laws.

On the topic of “personal data”, Brazil, although it has not adopted a strict “omnibus law”, uses the concept to ensure that legislation/regulation subordinate to the Constitution is always in accordance with it in all aspects. If this does not happen, the legislation/regulation will need to be changed or adjusted until it aligns with the Federal Constitution.

Data Protection Officers

The LGPD provides that organisations that process personal data must have a data protection officer (DPO). But the ANPD softened this rule (Resolution 2/22). Therefore, small data processing agents, depending on their profile, are no longer required to have a DPO. For organisations that need to have a DPO, there are some LGPD requirements that need to be met and other good practice rules. For example, the DPO must report to the company’s highest authority, have administrative and financial independence and be the link between the company and the external public.

Criteria for Data Processing

The requirements for processing personal data are all set out in the LGPD, and include everything from the collection process (what data to collect, from whom, how, in what form and for what purpose) to the process of ending the processing (return, maintenance or elimination). The LGPD also establishes where processing authorisation or consent applies, whether it is possible for the data to be shared and how its international transfer takes place.

“Privacy by Design/Default”

These principles are already found, at least in essence, in the LGPD, especially because it aims to ensure that the privacy of data subjects is guaranteed and protected from the beginning, without relying on third parties who have detailed knowledge or understanding of privacy settings. This gives data subjects greater control over their personal data and helps prevent unauthorised access or unwanted use of their data.

Impact Analysis and Privacy Policies

The LGPD has rules that aim to ensure that the processing of personal data is specifically fair, for a lawful purpose, on an authorised legal basis and dependent (if applicable) on a legitimate interest assessment (LIA), the analysis that allows determining whether data processing can even occur based on legitimate interest.

Data Subject Access Rights, Anonymisation and Pseudonymisation, Big Data and AI

One of the principle of the LGPD is that the data subject always has control and ownership of their personal data. This means that they, and only they, can guide the controller over what is possible and what is prohibited to do with their data. This is why the LGPD guarantees data subjects the right to determine the fate of their personal data, as they never lose ownership. For example, it is the data subject who decides on anonymisation, erasure, alteration, storage, and other actions involving their data.

Injury/Harm

As the Constitution establishes the firm concept that personal data is the property of the data subject and that its protection is a fundamental right, any injury (or threat) to this data is treated seriously and data has a high level of protection. Personal data involves material, emotional,

financial, reputational, intimate, and family aspects, and an injury (or threat) to personal data represents, in practice, an injury (or threat) to the concept of individual dignity, which deserves the protection that governments give it.

2.2 Sectoral and Special Issues

Ordinary and Sensitive Data

Under Brazilian legislation, personal data falls into two categories: ordinary and sensitive. Ordinary data is “common” data that does not intensely affect the privacy or intimacy of its subject. Sensitive data, on the contrary, is data with a greater degree of intimacy and therefore carries a greater need for protection for the subject. Different or intermediate degrees (such as data relating to financial, academic or previous criminal activity) have not yet been included in the legislation.

Ordinary data has “ordinary” protection, that is, common protection; sensitive data has “special” protection, and its processing can only be carried out under specific conditions. For example, ordinary data can be processed if there is a legitimate interest, and this allows for an open range of possibilities; but sensitive data cannot be processed under a legitimate interest, other legal bases applying to them (Article 11, LGPD).

There is a risk that has become common among data controllers: assigning ordinary data the status of sensitive data, just because it seems that certain data, by its nature, “should” be considered sensitive. In principle, the decision is nothing unusual. But it is necessary to remember that if the controller itself decides to reclassify certain data, from ordinary to sensitive, its decision is incorporated into its internal practice, and this is incorporated into its policy, even without a written rule. This means that, after making this decision, it is not possible to go back, and its effects can complicate things for the controller.

Command Data

Although national legislation only talks about common and sensitive personal data, there is a category of data that can complicate things. This is what is known as “command data”. This class includes elements such as tracking, image capture, targeted advertising, active location, behaviour in the media and social networks, provoked responses or comments, among others. Command data is so-called because it is not always personal data generated by the holder, but derived from an external action that leads the holder to produce data that it did not have before that action. This type of data has been gaining in importance, and the tendency is for legislation to also provide it with protection.

Privacy and Public Safety/Public Interest

The LGPD provides that data associated with these practices can be processed for the purposes of applying criminal sanctions, which signals that, in this case – as the Superior Court of Justice of Brazil recently decided – the collective or social value can outweigh the individual value.

The Right To Be Forgotten

The Supreme Court (RE 1,010,606) has found that the right to be forgotten is not compatible with Brazilian law, and for this reason argued that the passage of time, in isolation, is not a reason to prevent facts from being publicly disclosed.

2.3 Online Marketing

The boundaries between unsolicited communications and irregular processing of personal data are conceptual rather than concrete. In the EU, “consumption access” may require authorisation (not consent) from recipients, and recommendations continue to be that an individual’s email should not be used for mass communications or pre-ticked boxes for authorisation.

Brazil is preparing to regulate the practice, but only the State of São Paulo (Law 17,334/21) has rules to prevent unwanted calls and unsolicited commercial messages (or active capture of preferences and profiles). In any case, the Consumer Protection Code (Law 8,038, article 39, III) establishes that the supply of unsolicited goods or services is an “abusive practice” and prohibited. Recently, Bill 310/22 went further: it prohibits telemarketing companies from unwanted contact with people, including automated calls.

Targeted advertising, especially towards more vulnerable people, such as children and the elderly, is also considered abusive and prohibited by consumer law.

2.4 Workplace Privacy

The work environment benefits from the concept of privacy. But, in times of remote or hybrid work, it is not simple to define the “workplace”, as it can be the physical environment or a place where the worker performs tasks (home or public place). The consensus seems to indicate that the typical “workplace” is the physical location of the company where the worker provides services.

Companies have been increasingly concerned about personal data privacy in this case, as workers, even outside their physical locations, also need to manage data for their activities. Therefore, the number of companies that have been adopting strict control and privacy policies when processing personal data outside their facilities is only growing, with the signing of confidentiality and non-disclosure terms, digital security commitments and secure data management and information.

Codes of conduct and integrity in personal data privacy and internal personal data processing notices have also become common and there is almost always no inclination that these violate workers’ privacy. The Brazilian Labour Court has already made it clear that employees have an obligation not to violate the personal data of third parties, especially if this is what is expected of their activities in the company.

Another point of caution is that workers who manipulate large masses of personal data in their activities are always subject to paid external capture so that they provide (or facilitate access to) strategic data (personal or not) to the employer’s competitors or to people who are dedicated to predatory practices. It is true that Brazilian legislation allows organisations to adopt measures, technological or otherwise, to protect their strategic information and the personal data it processes. But it is also true that a significant number of organisations have not yet adequately prepared themselves for this.

As for AI guidelines, Brazil is expected to have a legal framework in place for AI in the coming months, based on ongoing legislative proposals. For now, events related to AI, in the workplace, can be conducted based on the Internet Legal Framework and the LGPD, according to the rules that are applicable.

2.5 Enforcement and Litigation

Brazilian regulators have at their disposal a group of mechanisms to open investigations into violations of personal data guarantee, security, and privacy laws.

According to the LGPD, the ANPD can directly interfere in an organisation's data processing activities. This can be done in three ways:

active regulatory intervention, if the controller has been accused of systematically violating the rights of the personal data subject;

suspensive intervention (Article 52, X); and

punitive intervention.

In general, the regulator initiates an investigation against the processing agent and assesses the nature and severity of the infractions committed, ensuring a full defence and production of evidence. The main basis for this is the "conduct of the processing agent", the actions and measures it adopted – or failed to adopt – (which led to the vulnerability of its controls) and the documentation in data processing. Therefore, before even proving the infringement, the regulator can consider the nature and severity of the conduct as a way of arriving at the most appropriate legal assessment.

Classification and Penalties

In general, the regulator considers violations to be direct or indirect, and may include cross-cutting violations. The direct ones result objectively from the agent's conduct, the indirect ones result from the worsening of the effects of its conduct and the transversal ones consider the impact of the violation on other agents and regulators.

The regulator can also apply penalties provided for in the LGPD, generally in the "verticalisation" regime (from least serious to most serious). Even penalties may vary depending on the nature and quality of the infraction, because if the same infraction can be considered and punished by more than one regulator, it is possible that the original penalty will be aggravated by a secondary regulator (which does not directly regulate personal data).

Class Actions

Private legal disputes over violations of privacy or intimacy are common, including through so-called collective actions, in which different actors come together to protect rights or discuss legal duties that apply to everyone. Collective defence entities have been concerned with the issue of "indistinct privacy" or "collective privacy". In this case, there are no specific individuals affected by a privacy breach, but an indistinct group of them.

This is the case of personal data leaks. Consumer relations organisations and the Public Prosecutor's Office have taken a stand on it, especially in relation to data leaks related to payment arrangements articulated by the Central Bank. This is of particular relevance as Brazil is the fourth preferred global target for personal data breaches.

3. Law Enforcement and National Security Access and Surveillance

3.1 Laws and Standards for Access to Data for Serious Crimes

Article 4, III, of the LGPD establishes the so-called "exclusionary principle". In short, this Article states that the LGPD rules have restricted application when the subject is the processing of personal data related exclusively to public security, national defence, State security or investigation and repression of criminal offences.

Therefore, if data processing is related to these purposes, it will not be fully subject to the LGPD, and the government will not necessarily be obliged to ask the regulator for access to databases of crimes, infractions, and related processes. This does not mean that the authority accessing the data is entirely free to use it as it wishes. This is because another principle of the LGPD, “purpose”, establishes that, once the government declares that access to data is related to the repression of crimes and infractions, it cannot change this purpose to another. For example, the LGPD says that the public administration that accesses the data cannot transfer it to third parties, with exceptions, and that the regulator can act against the government if it violates this legal assumption.

Another aspect to be considered is that the public authority that wants to have access to data in cases of repression of crimes and infractions can go directly to the judiciary, without going through the regulator. But this creates a problem: special instance suppression. Once there is a regulator, only if it refuses to allow access to data can the government ask the judiciary to act on the case.

3.2 Laws and Standards for Access to Data for National Security Purposes

The issue of “national security” is a problem that has not yet been legally resolved in Brazil. This is an “open concept”, which allows for multiple interpretations, and this lack of definition on Brazil’s part has placed the country in a delicate situation before the world and some organisations, such as the OECD.

The LGPD itself does not have clear rules on the handling of personal data when it comes to “national security”. For example, Article 4 speaks, ambiguously, of “national defence”, a concept that is not always the same as “national security”, which is much broader.

The current situation is that the LGPD (Article 4, III) does not fully apply if the processing of personal data is objectively related to “national defence” and “state security”. In principle, if data processing is intended for one of these purposes, the public agent is not subject to the LGPD, and therefore does not need authorisation from the regulator to access intelligence, state defence or “national security” databases.

As for the OECD, Brazil, although invited to join this entity, has not yet met all the necessary conditions. But the arguments continue, even though the matter is not on the list of priorities of the current government.

3.3 Invoking Foreign Government Obligations

Brazil has joined the Budapest Convention on Cybercrime. The document requires each country to maintain the legal authority to compel organisations in its territory to disclose data (including personal) that is in their custody, regardless of whether the organisation also has custody of data from other countries.

This means that Brazil must, even without adhering to an agreement on the free movement of personal data for certain purposes (such as the American Cloud Act), examine requests for data capture and transfer. The Cloud Act (Lawful Use of Data Abroad Clarification Act), passed in 2018 by the United States Congress, is basically the result of the limits of the Stored Communications Act (1986). It determines that US data and communications companies must allow access to customer data, even if their repositories are outside US jurisdiction. This created a problem for the GDPR, which, after the Cloud Law, linked access to data stored in a foreign

country to prior judicial authorisation from that country. See 1.8 Significant Pending Changes, Hot Topics and Issues (Safe-Harbour Agreements and the Schrems Case).

But a foreign government's request based on the Budapest Convention, or an agreement like the Cloud Act, does not indiscriminately give a private organisation the right to request access to personal data included in the government's request. This organisation, based in Brazil or another country, needs to use its own means to access the personal data it desires, and is subject to scrutiny by legislation and the judiciary.

3.4 Key Privacy Issues, Conflicts and Public Debates

Privacy and Data Monetisation

The topic of citizen privacy is gaining more and more attention, and debates around it have featured in Brazilian media. One of these issues relates to "data monetisation", which basically means that an organisation can "commercialise" its database, thus obtaining a financial return. As data (and not just personal data) is an extremely valuable asset (sometimes referred to as virtual gold), monetising it can be advantageous. But what are the limits? What kind of rules can protect the data subject from a leak? How to protect it from the phenomenon of "dispersion" (when data is spread out in such a way that its control becomes, in practice, impossible)?

Agreements Between the State and the Private Sector

Another debate involves the government, which, discreetly, has signed agreements with private entities and representatives of business sectors. The Central Bank, for example, signed co-operation agreements with private entities representing financial institutions. These agreements provide authority for the Central Bank to share a large database (National Civil Identity), which includes sensitive data, such as biometrics. The Federal Public Ministry is investigating the matter, and representations were made, including to the Federal Audit Court (TCU), which found no irregularities in the agreements.

4. International Considerations

4.1 Restrictions on International Data Issues

The international transfer of personal data is a topic to be considered carefully. Such transfers may indicate that data, once out of national jurisdiction, is "lost" (or dispersed) forever, especially in regulatory terms.

In the LGPD, international transfers are an exception, both active (from Brazil to abroad) and passive (from abroad to Brazil). Such transfer, according to the LGPD, is only possible:

if items II, V and VI of Article 7 of the LGPD are met;

if necessary for international legal co-operation between public intelligence, investigation, and prosecution agencies;

if necessary for the execution of public order or the legal assignment of public service;

if the controller provides and proves a guarantee of compliance with the principles, rights of the data subject and the personal data protection regime provided for under the law;

if the data subject gives their consent;

if the ANDP authorises it;

to countries or international organisations that guarantee an adequate level of data protection (similar) to that provided for in the LGPD;

when intended to protect the life or physical safety of the holder or third parties; and/or

when it is the result of a commitment under an international co-operation agreement.

Importing data via international transfer is possible based on:

data filters;

formalisation;

judicialisation of the transfer – this is not treatment subject to the LGPD, (Article 4, IV)

source conformity level;

the use of transfer; and

verification of Brazilian destination.

4.2 Mechanisms or Derogations That Apply to International Data Transfers

The international transfer of personal data, according to the LGPD (and the GDPR), is a typical data processing activity and must meet legal conditions, including derogations (specific authorisations that consider knowledge of the risks involved).

These conditions include that the transfer:

cannot include more data than necessary;

must be done on a legal basis;

must be naturally informed;

must be subject to one of the derogation possibilities (LGPD, Article 33 or GDPR, Article 9, Section 2);

must be subject to real measures to protect and contain risks; and

must have a fair, legitimate and non-prohibited purpose.

As for multilateral mechanisms, the transfer (especially international) of personal data must be regulated in a Personal Data Transfer Agreement (PDTA), with rules that guarantee the bilaterality of the data communication contract. Additionally, a data privacy notice is highly recommended.

4.3 Government Notifications and Approvals

The legal hypotheses that allow the international transfer of personal data are in the LGPD (Article 33). The transfer cannot be made without these derogations.

One of these hypotheses establishes that the regulatory body can authorise the transfer, but this requires that the event meets one of the legal bases of the LGPD. Although the government has decided to carry out an international transfer of data, the case must fall within Article 33 of the

LGPD, and even then, it is up to the regulator to evaluate the “transfer conditions”, provided for in Article 35.

In general, public persons referred to in the Access to Information Law (Article 1) may request the regulator, before international data transfer, to assess the degree of data protection afforded by the country or international organisation that will receive the material.

4.4 Data Localisation Requirements

Regarding personal data localisation, a point of interest is that Brazilian legislation has adopted the “principle of irrelevance of location” (Article 3). The point where the data is located (or stored) is not significant for law enforcement.

But this depends on the following conditions:

the personal data to be processed is collected in Brazil;

the processing operation must be carried out in the national territory; and

the purpose of the processing activity is to offer or supply goods or services, or process the data of natural persons located in the national territory

Data that, due to its nature, purpose, quality, scope, and content, must remain in Brazil, cannot be transferred, such as personal data used by research bodies in public health studies (LGPD, Article 13, Section 2).

4.5 Sharing Technical Details

The sharing of personal data with third parties is an exception to the usual obligations on a data controller, because this data should normally remain under its custody, so that the data subject’s privacy is protected. But, if sharing is necessary, some rules must be observed. GDPR rules require that all data subjects be encrypted, which includes thinking about security systems for managing keys. Under the LGPD, there is no obligation for encryption, but a requirement that secure techniques be put into practice to make personal data unintelligible, and the most obvious solution to such a requirement is encryption.

There are no explicit rules in the LGPD on how key elements (source codes, software and other technical data) should be shared with the government, this subject requires further regulatory guidance in Brazil.

It is possible for public and private entities to share personal data, as long as they comply with Article 25 of the LGPD and the data is used for public purposes, in the public interest, in the exercise of legal powers or in the fulfilment of legal public service duties.

In addition, sharing does not necessarily mean a violation of copyright protection, as algorithms, for example, are not always seen as “intellectual products” (Law 9,610/98, Article 8, I). But it is necessary to consider that sharing typical intellectual creations – such as source codes – can lead to legal disputes (Law 9,609/98, Article 2, paragraph 5).

4.6 Limitations and Considerations

Agents who collect or transfer personal data in connection with requests from a foreign government are subject to the LGPD, provided that the data was collected in Brazil and that at

least one processing activity was carried out in the country (Article 3). According to Article 3 of the LGPD, it is irrelevant whether the agent is located in Brazil or abroad, as what establishes the application of Brazilian data law is the place where the data was collected and where it was subjected to processing. In the case of an international data transfer between an organisation and the entity that contracted it, however, the transferee is subject to the LGPD transfer rules – ie, a legal basis (Articles 7 and 11) and a purpose will be required, in accordance with Article 33 of the LGPD.

4.7 "Blocking" Statutes

This type of statute is becoming increasingly widespread, and its rules provide for limitations that, if they do not prevent practices involving personal data, create conditions that processing agents must comply with before acting.

Even though blocks are not always related to the protection, security and privacy of personal data (as this is not always the focus), it is undeniable that one of their effects is to create difficulties for practices that would otherwise be permitted.

An example is the EU GDPR, which has already been seen as a blocking tool for transfers of personal data to non-EU agencies (applying Article 49(1)(d)) when it comes to “important reasons of public interest”.

This was made most evident by the US District Court decision (2019), which calls for an answer as to whether the GDPR is in fact a blocking statute under US law.

5. Emerging Digital and Technology Issues

5.1 Addressing Current Issues in Law

Some of these topics are addressed, directly or indirectly, by the LGPD, such as facial recognition, biometrics, pictorial data processing, personal distinction, profiles, metadata and reverse data.

Drones

There is still no specific comprehensive legislation on drones in Brazil. Some standards (such as Special Civil Aviation Regulation 94/2017 of the National Civil Aviation Agency) try to overcome this gap, especially regarding the need to preserve the private life and intimacy of individuals.

Big Data

The mass (intensive) acquisition of personal data is strongly impacted by the LGPD. Article 20 establishes that it is the data subject’s right not only to know on what legal basis decisions were made regarding them, but also to request corrections, changes and repair of abuses.

AI and IoT

Law 14,108 (the “IoT Law”) is not the legal framework for the subject, but it creates government incentives for technologies focused on IoT. Brazil does not yet have a legal or regulatory framework for AI. At this moment, the most relevant and current initiative is Bill 2,338/23.

Dark Patterns (DPs)

Dark Patterns are user interface elements that, through attention items, colours, positioning, flashing elements and other artificial techniques, try to induce the individual to opt for something that, in fact, they did not want or would like to buy or use.

The Consumer Protection Code conceives of dark patterns as a type of misleading advertising. This is because this Code establishes that it is the consumer's basic right to have access to "adequate and clear information about different products" and determines that "coercive or unfair commercial methods", which include obscure patterns, are abusive and illegal.

Profiling or Micro-targeting

The subject of "profiling" has been under discussion for years, but only with privacy laws has its relevance become evident. For the GDPR, "profiling" is "any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular, to analyse or predict aspects concerning the work of that natural person, their economic situation, health, personal preferences, interests, reliability, behaviour, location or movements".

The Brazilian data law, the LGPD, goes even further, and says that personal data is considered to be any data used in generating the profile of an identified person (Article 12). This means that the elements that form the profile, and the profile itself, can be under the protection of the law, including the rights and duties it establishes, as stated in the LGPD (Article 20).

But is it just the formation of a profile that must comply with legislation? It seems clear that profiling, as well as its potential variations (microtargeting, etc), since they are based on the same principles and concepts (tagging people with a defined objective), must be evaluated under data protection legislation.

Fiduciary Duty

Brazilian legislation states that a bond is formed between the controller and the holder, and this requires the controller not only to comply with the legislation, but also not to frustrate the legitimate expectations of the holder.

5.2 "Digital Governance" or Fair Data Practice Review Boards

Brazil does not yet have specific regulations on digital governance (or on personal data, or AI) and nor has it implemented a regular practice in this field, even though the LGPD provides one (under Article 50) and recommends the introduction of general governance practices in organisations.

In fact, organisations create governance committees themselves, generally linked to their DPO, so that issues such as risks, compliance, standards, management and documentation can be addressed on a legal and technical basis.

5.3 Significant Privacy and Data Protection Regulatory Enforcement or Litigation

There are no specific cases on the protection of personal data involving repercussions and penalties in Brazil's recent history. However, it is worth remembering that the number of lawsuits related to this issue is only increasing, and has now reached the thousands, which means that the ANPD, at some point, will need to get involved in these cases.

5.4 Due Diligence

Talking about personal data and its protection in Brazil is still new, but a good number of due diligence processes are starting to value the search for compliance in the processing of personal data related to transactions between companies.

Cases of investment planning and strategic partnerships are requiring partner, invested, or synergistic companies to present a compliance diagnosis related to the LGPD and, in several cases, a diagnosis connected to the GDPR.

This may include:

analysis of operators and sub-operators;

collection of data protection documents (policies, procedures, protocols, and guidelines);

consultation on the history of incidents involving personal data and communications to the ANPD, other regulatory bodies, and data holders;

information on judicial or administrative proceedings relating to the LGPD;

measurement of the flow of service to the demands of holders and those involved in the service;

the value of personal data;

the value of the need to comply with other laws in international transfers;

the value of the systems used in processing activities;

verification of the privacy framework, whether there is a DPO, and a privacy committee; and

verification of the technical and organisational measures adopted in the processing of personal data.

5.5 Public Disclosure

There is still no specific legislation in Brazil that requires disclosure of an organisation's cybersecurity risk profile.

This can be explained as follows: in personal data protection, the country needs to make progress before instituting a cybersecurity or personal data security classification; and this classification depends on the maturity of data security and privacy concepts and principles.

The activities of assessing, measuring and monetising the risks of processing personal data are new in the country, and the criteria are not yet very clear. One example is vulnerability analysis for classes and categories of manipulated data. This kind of analysis evaluates four pillars: compliance with legislation and safety standards, blank spaces for security incidents, resilience to potential threats (internal and external), and protection systems implemented.

5.6 Digital Technology Regulation/Convergence of Privacy, Competition and Consumer Protection Laws (Including AI)

Key trends in terms of data protection and privacy (including in regard to personal data) include the following.

The Digital Services Act (DSA) has started to apply to online platforms and large search engines. In Brazil, a similar law is being discussed, which would act on open and closed digital markets (NFTs, certificates, electronic business chains, among others).

A Bill on the AI Legal Framework is under discussion, and everything indicates that it will be accelerated by the approval of the AI Act in the EU. This indicates that many important concepts will be incorporated into the framework, such as the principles of “innovation” and “logical precision”.

The ANDP is considering approving specific rules on the sharing of personal data (including sensitive ones, under certain conditions) between controllers, in order to reduce the risks of data dispersion.

5.7 Other Significant Issues

The most significant topics for data protection regulation in Brazil include:

data processing in environments regulated by other authorities;

DPO technical and operational standards policies;

leading security incident investigations in the case of agents and members of different organisations;

massive (intensive) data processing (regulation and limits);

monetisation and demonetisation of personal data;

permanent international transfer of personal data;

personal data as a legacy in international transactions;

service level agreements on personal data processing compliance; and

sharing of public databases and their effects.

158. [Artificial Intelligence: What is it and Can it Help My Business?](#)

What is Artificial Intelligence?

Artificial intelligence is the science and engineering of creating intelligent machines, particularly intelligent computer programs. In general, these intelligent programs are able to understand large amounts of data. The main purpose for doing so, is to solve complex problems, make decisions and make predictions based off that data. Importantly, they can do this on an expansive scale. In this way, AI is constantly learning, just like humans. Also, the capabilities are virtually endless for AI machines and in recent years, the [AI community](#) have made leaps and bounds in their development and innovation.

Examples of Artificial Intelligence

We all interact with some form of artificial intelligence on a daily basis. It’s not just about high-tech machines and robots. Do you own you use a Smart Assistant, such as Siri or Alexa? Maybe

you own a self-driving car? Do you use Netflix, Facebook, TikTok and other social media platforms? Maybe you own a robot vacuum cleaning? Well, all of these examples are a type of AI. For instance, social media platforms and Netflix use a variety of algorithms to understand your interests and show you content on that basis.

How Artificial Intelligence can help your business

Artificial intelligence has a great usage across many types of businesses. Now, AI is not going to replace your employees jobs. But, it will make their jobs a lot easier. Many companies and firms within the [legal industry](#) are already utilising the benefits that AI has to offer. Below, we'll take you through just a few ways AI systems can be used to improve your businesses efficiency.

Customer Service

A variety of businesses use online Chatbots. It's basically an automated assistant that offers to answer your many questions, and they can! Many Chatbots have the capability of answering a customers questions in a matter of seconds. Therefore, Chatbots are able to understand your customers problems and provide a quick and relevant solution or answer. Thus, they can help improve the efficiency of your businesses customer service, ensuring no customer is left waiting for a response.

Speech Recognition

We are all aware that Siri and Alexia have been making their way into many Australian homes. But, what about the workplace? Well, speech recognition can be a valuable tool if your business is strong on writing and communication. Specifically, speech recognition programs can aid in speeding up your businesses writing process by using verbal cues, demands and sentences. Saving you valuable time to work on more pressing tasks.

Increased Data and Information Security

AI can be implemented into your workplace to increase your businesses security systems. Therefore, you don't need to be worrying about whether your businesses security is going to be breached, and data is going to be leaked. AI can improve your systems and allow your business to live up to its policies around data and information, including your [privacy policy](#). AI systems are able to detect when a breach may occur, before it has occurred. Thus, improving the quality and security of your businesses privacy and data.

Key Takeaways

There is no doubt that artificial intelligence has gained increased popularity and momentum in recent years. But, AI is so much more than robots. Many of us already interact with a variety of AI systems on a daily basis. Possibly without even realising. In general, artificial intelligence can be defined as a machine or program with the capabilities of understanding large amounts of data, and giving a specific and tailored result. Many businesses have even opted to use AI tools to help with their businesses tasks and operations. You can too!

[159. Webber Wentzel embraces Generative AI as part of its ongoing innovation journey](#)

While Webber Wentzel has been engaged in AI innovation for some time, it recognises that generative AI is the next frontier and warrants a prioritised and purposeful response from the firm.

The firm has dedicated significant resources to explore, pilot and embed generative AI into its business, with a parallel focus on continuous learning and empowerment of employees. This commitment will allow the firm to remain at the forefront of AI applications in law, ensuring that their clients and employees benefit from the most advanced and effective legal technologies.

"We are excited about the transformative potential of generative AI and the efficiencies it can bring to our business. We are following a pioneering but responsible approach to AI innovation, carefully balancing the opportunities with the associated risks and challenges" said [Sally Hutton](#), Managing Partner.

Webber Wentzel has adopted an investment framework that is tailored to its strategic priorities, the nuances of its business and the legal services sector, and the potential risks presented by the technology and in June 2023, adopted a formal generative AI policy.

The firm's generative AI policy has been carefully crafted to safeguard the interests of the firm's clients, addressing confidentiality, data security and intellectual property concerns, and ensuring that the firm's use of generative AI is always strictly within legal and ethical bounds.

"We are applying an investment mindset that is both forward-thinking and grounded in pragmatism and long-term sustainability. We recognise that generative AI is not a magic bullet. We are committed to choosing the right legal technology for each unique use case to scale our expertise and capability, with the aim of providing a top-tier experience that exceeds the expectations of both our clients and people," said [Aalia Manie](#), Head of Legal Solutions & Technology.

Webber Wentzel's AI investment approach reinforces its position as an leader in legal innovation in Africa, demonstrating a keen commitment to both technological advancement and legal and ethical responsibilities, and ensuring that the firm continues to shape and practise the future of law, today.

[160. Responsible AI: embracing generative artificial intelligence technologies- a brief guide for organisations](#)

Responsible AI: embracing generative artificial intelligence technologies- a brief guide for organisations

With the boom of ChatGPT, AI frenzy, and similar technologies ("generative AI") companies are questioning whether to allow their staff to utilise Generative AI for company purposes and if so, how to regulate such usage in order to minimise legal risk, especially in the absence of regulation in most jurisdictions.

Whilst some companies have adopted the view that they will not allow staff to utilise generative AI (which in itself is risky), for companies that are looking to leverage the benefits of generative AI in a responsible manner, we would recommend that such companies institute a number of

measures. Before we expand on what measures companies should seek to adopt, we start with a short discussion on the risks around the usage of generative AI.

Generative AI technologies risks

ChatGPT and other generative AI technologies expose companies to a myriad of risks including:

Corporate governance and accountability – In South Africa, King IV places an imperative on company boards to ensure sound information governance and sound data governance. The adoption of generative AI technologies should therefore be led by the board as opposed to allowing employees usage to be unchecked. This also ties in with the condition of accountability under the Protection of Personal Information Act, 2013;

Confidentiality – as the majority of AI technologies are owned by third parties, a company risks its employees disclosing confidential information or trade secrets to unauthorised parties;

Cybersecurity – if any confidential information is disclosed, it will be stored in third party databases. If a hacker breaches the database, there is a risk that the company's sensitive information could be unlawfully accessed;

Data privacy and protection – a company should list the categories of confidential or sensitive information which employees may not upload or use when accessing AI technologies;

Intellectual Property – a company should clearly indicate its ownership over its data and outputs generated by Generative AI technologies (provided that it is the company and not a third party is entitled to ownership over such outputs);

Regulatory compliance – a company needs to ensure that its storage and processing of data or personal information is in accordance with applicable laws;

Liability – the use of AI could give rise to claims from a number of sources including clients, users, third parties, and even regulators;

Contracting – as companies would inevitably rely on third party service providers to provide skills as well as tools, companies should ensure that agreements with such service providers do not include any exclusion of liability and/or restrictive liability provisions;

Data bias and discrimination – any biases in the company's data could to an AI reinforcing stereotypes, discriminating against people, or creating exclusionary norms;

Outdated or inaccurate information and misinformation – a company relying on generative AI runs the risk that the information used by the AI might be outdated or inaccurate which could lead to incorrect responses being generated. Companies also face the risk of their AI being a target of misinformation campaigns; and

Unqualified advice – if employees use generative AI to generate advice and provide such advice to clients without review, it could lead to a situation where advice has been given by unauthorised entity.

What if my organisation does nothing?

If a company's stance on AI in the workplace is prohibitive or silent, it could lead to a situation of shadow IT. Shadow IT, is an organisational challenge, where employees adopt a technology which

is not implemented or deployed by the company. If companies ban ChatGPT and other generative AI technologies, employees could resort to secretively utilising such technologies. This would further compound the company's risk as it would not be able to regulate or even monitor employee usage of AI. It is recommended that companies adopt a policy to address and regulate AI use in the workplace in order to mitigate some of the abovementioned issues.

What interventions can a company institute?

Whilst there is not a once-size-fits-all approach when it comes to the type of interventions to be instituted, as this would be largely dependent on the scope of usage of generative AI in the company's operations, in the absence of interventions, some of our suggestions include:

Governance: the board needs to ensure that proper structures are put in place as well as safeguards employed in order to ensure the adoption of Responsible AI. These may include establishing Centres of Excellence, dedicated task teams, and or other structures whose focus is ensuring that AI is adopted in a Responsible manner in keeping with the values and culture of the company and also in order to mitigate legal, technical and financial risk;

Policy implementation: a sound policy for the adoption of Responsible AI needs to be implemented. These would include not only mechanisms to mitigate legal, technical and financial risk but also ensure that ethical boundaries have been established based on the company's own value system;

Training: companies should ensure that staff are trained at various levels and that training be adapted depending on what role staff members undertake as part of the company's AI initiatives. Example: (i) legal and technical teams should undergo training on more than just the legal and technical risk of AI adoption but also on AI ethics and financial risks; and (ii) board of directors need to be trained on both ethical and legal considerations in order to establish a culture of Responsible AI;

Contracting – as companies would rely on third party service providers in order to deploy AI solutions, companies should ensure that they establish sound contracting standards in order to mitigate against the risk of a supplier providing tools and/or solutions which may give rise to claims and such supplier not being liable due to restrictive liability provisions. Further, the usual due diligence in supplier selection needs to also be adopted;

Ethical impact assessments: Although not mandatory, it is a useful tool to ensure that any projects undertaken or AI being adopted complies with the company's policies and applicable laws;

Ethical reviews: as part of this, companies may wish to establish a distinct AI ethics review board, which would also engage in the approval of projects based on ethical impact assessments undertaken.

Pioneering industry initiatives or codes of conduct: leading companies may wish to pioneer the adoption of industry acceptable codes of conduct, including obtaining approvals from regulatory authorities such as the Information Regulator; and

Auditing and monitoring: as with any compliance initiative, boards should ensure that proper resources are dedicated to ensuring compliance with interventions adopted, as well as dealing with violates of company policies.

Regardless of whether a company deploys or utilises AI technologies in the workplace, it should ensure that it has adopted mechanisms for Responsible AI interventions and that such interventions are led from the very top.

The adoption of Responsible AI comes with several complexities, and expert guidance is often crucial in this process. In order to assist clients in fast tracking the adoption of Responsible AI, our expert TMT team have developed an AI Toolkit. We would strongly urge companies to engage with us in order to ensure that AI adoption is done so in a Responsible manner and that company risks are mitigated. For more information on our AI Toolkit, please contact: